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ABSTRACTS

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PODIUM ABSTRACTS

WHAT ARE THE CONTRIBUTIONS OF TUMOR LOCATION, SITE OF METASTASES, AND KRAS STATUS TO PROGNOSIS IN COLORECTAL CANCER PATIENTS WITH ISOLATED LIVER OR LUNG METASTASES?

GS1

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Purpose/Background: Factors affecting prognosis for patients with stage IV colorectal cancer (CRC) are not entirely understood. Cancer specialists have suspected that tumor sidedness plays an important role, and that isolated lung metastases portend improved survival compared to isolated liver metastases, leading to variable recommendations in management. In this study, we determined differences in survival of colorectal cancer (CRC) patients with isolated lung as compared to isolated liver metastases in relation to primary tumor location and KRAS mutation status.

Methods/Interventions: We identified all patients with a histologic diagnosis of CRC and isolated liver or lung metastases at time of diagnosis from the National Cancer Database (NCDB) between the 1/2010 through 12/2014. Primary tumor location was categorized as right-sided (proximal to splenic flexure), left-sided (splenic flexure and descending colon), rectosigmoid, and rectum. Tumors were further categorized as KRAS wild-type (WT) or mutant, when testing was performed. Patient demographics, staging criteria, and details of management including chemotherapy, radiation, primary tumor resection, and metastectomy were collected. We then developed survival curves using Kaplan-Meier estimates and adjusted multivariate Cox regression analyses to evaluate specific factors associated with overall survival.

Results/Outcome(s): A total of 38,328 patients with colorectal adenocarcinoma and isolated liver or lung metastases at the time of diagnosis were identified. Among

them, 14,824 (39%) were right-sided cancers, 12,016 (31%) left-sided cancers, 3,821 (10%) rectosigmoid cancers, and 7,667 (20%) rectal cancers. There were 3,634 (9%) isolated metastases to the lung and 34,694 (91%) isolated liver metastases. We noted no difference in primary tumor resection rates by location when comparing colorectal cancers with isolated liver or lung metastases. Yet, metastectomy was more likely to be performed for isolated liver metastases as compared to isolated lung metastases (15-17% vs 5-9%, $p < 0.001$) regardless of tumor primary location. On Kaplan-Meier analysis, median survival was significantly longer for lung metastasis patients compared to liver metastasis patients for primary left-sided (27 vs 25 months, $p = 0.02$) and right-sided CRC (19 vs 15 months, $p < 0.001$), while rectosigmoid and rectal cancers had results similar to left-sided tumors (Figure 1). On multivariate analysis adjusting for patient and tumor characteristics as well as cancer therapy, patients with isolated lung metastases demonstrated improved survival compared to patients with isolated liver metastasis across all primary tumor sites ($p < 0.001$). However, patients with either lung or liver metastases from right-sided CRC were at greater hazard for mortality as compared to patients with any other primary site ($p < 0.001$). In the 13,655 patients with KRAS testing, KRAS mutants had worse survival (22 vs 26 months, $p < 0.001$), however this effect was largely due to the disproportionate numbers of patients with liver metastases (Table 1). Thus, KRAS mutants with liver metastases had significantly worse survival than KRAS mutants with lung metastases (22 vs 30 months, $p < 0.001$). Furthermore, right sided tumors with KRAS mutations had a trend towards improved unadjusted survival compared to KRAS WT, while all other primary sites had significantly worse survival ($p < 0.001$).

Conclusions/Discussion: Across tumor locations and after adjusting for patient demographics, tumor characteristics, and cancer treatment, isolated liver metastases portend a worse prognosis than isolated lung metastases

GS1 Median survival for Stage IV CRC patients stratified by tumor location, metastatic site, and KRAS mutant status

Metastasis	Location	Median Survival (months)		KRAS HR (95%CI)	p-value
		KRAS WT	KRAS mutant		
Lung	Right (n=292)	22.1	25.5	0.81 (0.60-1.08)	0.1
	Left (n=324)	33.7	30.6	1.20 (0.89-1.63)	0.2
	Rectosigmoid (n=115)	36.0	41.4	1.07 (0.60-1.92)	0.8
	Rectum (n=393)	30.1	30.4	1.09 (0.83-1.44)	0.5
	All lung mets (n=1124)	28.9	30.0	0.99 (0.86-1.16)	0.9
Liver	Right (n=4930)	16.7	20.1	0.96 (0.90-1.03)	0.2
	Left (n=4333)	31.5	23.7	1.44 (1.33-1.56)	<0.001
	Rectosigmoid (n=1252)	32.1	25.4	1.15 (0.98-1.34)	0.1
	Rectum (n=2016)	32.0	23.9	1.36 (1.22-1.53)	<0.001
	All Liver mets (n=12531)	27.1	22.0	1.23 (1.17-2.28)	<0.001
	Overall	27.2	22.8	1.45 (1.34-1.57)	<0.001

for patients with CRC. When investigating the molecular basis for this difference, KRAS mutant status carried a more dismal prognosis specifically in liver metastases when compared to lung metastases, indicating a potentially more aggressive tumor biology. Furthermore, right-sided CRC with either isolated lung or liver metastases had substantially worse overall survival. Taken together, these findings indicate the importance of factoring tumor sidedness and KRAS status into treatment plans for metastatic CRC rather than just site of metastasis.

COLON PRESERVATION UTILIZING ADVANCED ENDOSCOPIC TECHNIQUES FOR MANAGEMENT OF COMPLEX POLYPS.

GS2

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Purpose/Background: Complex polyps which are large or located in difficult anatomic positions at colonic flexures, tortuous segments of colon, near the ileocecal valve or around the appendiceal orifice pose a challenge to management using traditional endoscopic techniques alone. Advanced endoscopic techniques including endoscopic mucosal resection (EMR), endoscopic submucosal dissection (ESD), combined endoscopic and laparoscopic surgery (CELS), sleeve partial colectomy, and most recently utilization of endoluminal surgical intervention (ELSI) platforms, have demonstrated efficacy for complex polyp resection, while successfully avoiding colectomy. This study reports our institutional multidisciplinary experience with colon-preserving techniques for management of complex polyps.

Methods/Interventions: Retrospective analysis of a prospectively maintained institutional database identified 95 patients referred for “endoscopically unresectable” polyps from 2015-2018. These cases were compared to 190 propensity score matched controls identified from the same database at a 2:1 ratio. Control cases were matched to the type of colectomy that would be performed if endoscopic resection was unsuccessful as well as age, ASA score, gender, and BMI. Data extracted for analysis included patient demographics, pathology results, endoscopic and/or operative procedure, inpatient length of stay (LOS), rates of complete endoscopic removal, leak, unplanned 30-day readmission, unplanned 30-day reoperation, 30-day mortality, overall postprocedural complications, ileus, nasogastric tube (NGT) insertion, surgical site infection (SSI), urinary tract infection (UTI), and acute kidney injury (AKI). Continuous variables were assessed for significance using two-tailed t-test. Categorical data was assessed for significance using chi-square & Fisher’s Exact tests. Odds ratios were obtained using z-test. All cases were analyzed based on intention to treat.

Results/Outcome(s): Advanced endoscopic resection techniques successfully achieved complete polyp removal (without segmental colon resection) in 66/95 patients (69.5%). CELS was utilized in 22/95 cases (23%). ELSI platforms were used in 4/95 (4%). Sleeve partial colectomy was performed in 12/95 cases (13%). Approximately 48% of patients had one or more prior attempted endoscopic resections of the polyp of interest. Of these patients with previously unsuccessful endoscopic resections, 53% achieved complete resection through advanced endoscopic techniques and did not require sleeve partial or formal segmental colectomy. Final pathology demonstrated adenocarcinoma in 15/95 (16%) of specimens, requiring formal colectomy in all except four cases where T1 adenocarcinoma was completely resected to negative margins. Compared to propensity score matched controls, patients with endoscopic resection had a significantly shorter LOS (1.13 vs 3.89 days; $p < 0.0001$). They also experienced significantly lower rates of postoperative complications (4.2% vs 33.9%; $p < 0.0001$), ileus (2.1% vs 19.2%; $p = 0.001$), NGT insertion (3.3% vs 22.3%; $p = 0.0049$), and AKI (0% vs 10.1%; $p = 0.032$). Patients that underwent endoscopic resection had lower rates of unplanned 30-day readmission (2.1% vs 7.7%; $p = 0.077$), unplanned 30-day reoperation (3.2% vs 4.4%; $p = 0.618$), SSI (0% vs 6.5%; $p = 0.069$) and UTI (1.1% vs 2.5%; $p = 0.441$). None of the endoscopic polypectomy patients developed leaks compared to 4.2% of the matched controls ($p = 0.143$). There were no mortalities after endoscopic resection compared to 1/190 (0.6%; $p = 0.754$) of the matched controls. Propensity-matching of controls was successful for age, BMI, and gender. However, the control group had a slightly higher ASA (2.58 vs 2.37; $p = 0.007$) and rate of prior abdominal surgery (50.0% vs 35.8%; $p = 0.029$).

Conclusions/Discussion: Endoscopic resection of complex polyps can be highly successful and has less morbidity when compared with segmental colon resection. Shorter inpatient LOS and fewer postoperative complications (including postoperative ileus and AKI) are benefits of this approach. Utilization of multiple advanced endoscopic techniques facilitates successful management of lesions deemed “endoscopically unresectable” by other means.

COLON PRESERVATION UTILIZING ADVANCED ENDOSCOPIC TECHNIQUES FOR MANAGEMENT OF COMPLEX POLYPS.

GS3

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Purpose/Background: Acute diverticulitis, complicated or uncomplicated is a common cause of surgical admission and the usual modality of diagnosis is the Computed Tomography (CT) scan of the abdomen and pelvis. There are overlapping CT features with colorectal malignancy in

acute diverticulitis. The current guidelines from American Gastroenterology Association recommend colonic evaluation after acute diverticulitis. The last review by Sharma et al comprised of 11 studies and 1970 subjects. Since then, many papers have been published. Hence we present an updated systemic review and meta-analysis of 31 studies and 29640 subjects, to evaluate the role of routine colonic evaluation after radiologically proven acute diverticulitis.

Methods/Interventions: Medline, EMBASE and Cochrane library were searched from inception to 16 July 2018. Studies that analysed incidence of colorectal cancer (CRC) after colonic evaluation in patients with previous radiologically proven diverticulitis were included. A combination of both 'MeSH' and non-'MeSH' key terms using Boolean operators, were used on Medline: "colonic neoplasms", "colorectal cancer", "colon cancer", "colonic cancer", "colonoscopy", and "diverticulitis". A manual search of the reference lists of included studies was performed to identify additional relevant articles. A meta-analysis of CRC incidence was done by calculating the exact (Clopper-Pearson) confidence intervals for CRC incidence rates, and using the variance-stabilizing Freeman-Tukey double arcsine transformation to achieve approximate normality of the data. The pooled estimate was then computed using the random effects model with inverse variance weighting, and then back-transformed using the *metaprop* package in Stata. Univariable meta-regression was performed using the *metareg* command to evaluate whether rates of CRC detection varied according to the average age of each study population.

Results/Outcome(s): 31 studies comprising a total of 31805 patients were included in our study, published between 1997-2018. Diagnosis of acute diverticulitis was established with CT and clinical assessment. While not specified in all studies, majority of studies already excluded patients who had emergency surgery at index admission, colonoscopy within the past year of diagnosis and previous history of colonic cancer. 2165 patients were excluded from final analysis as they did not undergo colonic evaluation due to patient refusal, were lost to follow up or had severe comorbidities. Consequently, a total of 29640 patients were included in our analysis. The pooled CRC detection rate was 1.58% (CI 0.0115-0.0206), 643 cases out of 29640. There was no association when compared with age (CI: 0.00015 to 0.00048, P= 0.0005). Further analysis of studies who classified subjects with complicated and uncomplicated diverticulitis was performed. Out of 4061 patients with uncomplicated diverticulitis, 64 patients were found to have cancer 1.19% (CI 0.0064-0.0188). Out of 636 patients with complicated diverticulitis, cancer was found in 37 patients, incidence rate of 5.55% (CI 0.0249-0.0946). Relative risk of CRC finding in complicated compared to uncomplicated diverticulitis was 4.664 (95% CI: 3.047 to 7.140; P < 0.0001). We then performed a further subgroup analysis comparing Asian and Caucasian studies. This comprised of 14 papers with

a total of 4207 patients. 2 Asian studies (Choi 2014 and Soh 2018) had data for uncomplicated diverticulitis. The pooled proportional estimate of CRC in these patients is 3.49% (10 out of 263). The relative risk of Asian patients with uncomplicated diverticulitis compared to Caucasian is 2.605% (p=0.0073). Only 1 study (Choi 2014) had data for complicated diverticulitis, where 3 out of 21 patients were detected to have cancer, a proportional estimate of CRC 14.29%. Relative risk compared to Caucasian studies is 2.566% (p=0.0931), not statistically significant.

Conclusions/Discussion: The overall incidence rate of colon cancer detection in patients with diverticulitis is 1.58%. In patients with complicated diverticulitis, the detection rate is much higher at 5.55%. Hence, we strongly advise routine and early colonoscopy to avoid missed malignancies and delay in treatment. In our Asian subgroup, our study shows that there is higher risk of colorectal malignancy picked up during endoscopic evaluation in Asian patients with both uncomplicated and complicated diverticulitis compared to Caucasians. With a relative risk of 2.5 in both the complicated and uncomplicated subgroups, the indication for colonoscopy is even stronger in the Asian population. While we acknowledge that the numbers available are small, this study should at least act as an impetus for further studies to be done in Asian populations.

POSTOPERATIVE COMPLICATIONS FOLLOWING SACRAL NERVE STIMULATION FOR FECAL INCONTINENCE: ARE THERE ANY RISK FACTORS?

GS4

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Purpose/Background: Sacral nerve stimulation (SNS) has become standard surgical treatment for fecal incontinence (FI). Previous studies have reported various adverse events including implant site infection, pain, hematoma, and lack or loss of efficacy. This study aimed to determine risk factors associated with SNS complications and to analyze their management.

Methods/Interventions: All patients who underwent SNS Stage 1 or 2 implantation for FI between January 2008 and December 2017 were retrospectively reviewed using the EMR. Preoperative baseline characteristics, comorbidities, and etiology of FI were obtained. Pre- and postoperative Cleveland Clinic Florida - Fecal Incontinence Scores (CCF-FIS) were obtained from the patient's medical record review, during clinic visits, or during telephone interviews. Lack of efficacy was defined as no improvement seen after SNS implantation and loss of efficacy as loss of function after a period of improvement. The management and outcome of each postoperative event were evaluated.

Univariate and multivariate analyses were performed to assess association between preoperative factors and postoperative events

Results/Outcome(s): 293 patients [244 (82.3%) female; mean age 58.8 (range 19-91) years] were evaluated at a mean follow up of 26.5 (range 0-140) months. 240/293 (81.9%) patients underwent stage 1 and 2, 56/293 (19.1%) were lost to follow up. Overall complication rate was 76.8% (182/237); 38.5% (70) were successfully managed conservatively (37/70; 53%) or by surgery (33/70; 47%). 50/237 (21.1%) patients had their SNS explanted and 5/237 (2.1%) had it switched off. The average preoperative CCF-FIS was 16.5 (range 7-20) and on follow up decreased to 10.5 (range 0-20). The most common postoperative events were loss of efficacy (n=79; 29.3%), lack of efficacy (n=29; 10.4%), pain during stimulation (n=37; 13.7%), and pain at stimulator implantation site (n=33; 12.2%). For loss of efficacy, female gender and diabetes mellitus (DM) were significantly associated with OR 2.59 (1.10-6.09 95% CI) and 2.29 (1.12-4.69 95% CI, respectively), and 11/78 (14.1%) underwent surgical intervention (8 revisions, 3 explantations). Male gender (p=0.01), coronary artery disease (CAD) (p=0.01), prior radiation (p=0.02), and preoperative CCF-FIS ≥ 15 (p=0.01) were significantly associated with lack of efficacy, but on multivariate analysis, CAD and preoperative CCF-FIS ≥ 15 were significant with OR 9.26 (2.48-34.51 95% CI) and 10.52 (1.14-96.71 95% CI), respectively. 14/29 (48.3%) patients with lack of efficacy underwent explantation. Multiple deliveries as the cause of FI [OR 2.67 (1.22-5.82 95% CI)], age ≥ 50 [OR 0.14 (0.04-0.50 95% CI)], and BMI < 25 [OR 0.36 (0.15-0.87 95% CI)] were significantly associated with pain during stimulation and 7/37 (18.9%) had surgical intervention (6 explantations, 1 revision). BMI ≥ 30 was associated with pain at the implantation site with OR 2.12 (1.00-4.50 95% CI) and 11/33 (33.3%) had surgical intervention (9 revisions, 2 explantations). Other complications were infection (n=19; 7.0%), lead migration (n=10; 3.7%), seroma (n=5; 1.9%), lead fracture (n=2; 0.7%), wound dehiscence (n=2; 0.7%), perineum vibration (n=2; 0.7%), and toe flexion (n=1; 0.4%).

Conclusions/Discussion: The SNS implant is relatively successful in improving FI but has significant lack and loss of efficacy problems. Females and patients with DM were more likely to have loss of efficacy, while CAD and preoperative CCF-FIS ≥ 15 were risk factors for lack of efficacy. Multiple prior vaginal deliveries, age < 50 , and BMI ≥ 25 were risk factors for pain from stimulation. A BMI ≥ 30 was a risk factor for pain at implantation site. These associations should be considered during preoperative counselling and informed consent and during postoperative follow up.

RESIDENT ATTITUDES TOWARDS THE ROLE OF ROBOTIC SURGERY AND THE IMPLEMENTATION OF AN ELECTIVE ROBOTIC SURGERY CURRICULUM.

GS5

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Purpose/Background: An increasing number of hospitals offer robotic colorectal procedures to patients. As a result, it is important to introduce robotic surgery to General Surgery (GS) residents early on in their training. While the adoption of robotic surgery has expanded, there is a lack of standardized curricula for trainees. In 2016, the Yale Surgical Department introduced an elective Robotic Surgery Curriculum (RSC) to its residents. Residents who complete the program are eligible for a Training Equivalency Certificate from Intuitive Surgical, Inc. The resident may subsequently use this certificate as proof of competency during fellowship and in general practice. Here, we assess the current level of completion and attitudes towards robotic surgery amongst junior and senior GS residents at a single institution.

Methods/Interventions: An anonymous, web-based survey was distributed to all Yale GS residents. The survey included 10 questions encompassing attitudes towards robotic surgery and the level of completion of Five-Part Curriculum (Figure 1). To generate our survey, we completed a review of existing robotic questionnaires in the literature. Respondents were grouped into Juniors (PGY1,2, Lab year) and Seniors (PGY3-5). Statistical analyses include frequency tables and descriptive statistics. The chi-square test was used to compare respondents among cohorts. A p-value < 0.05 was considered statistically significant. All computations were performed using *Prism GraphPad*.

Results/Outcome(s): In total, 62 of 98 eligible residents responded to the survey (63.3%). 42 of the respondents were junior residents and 20 were seniors. Both junior and senior residents expressed interest in formal robotic surgery training (93% vs. 90%, p 0.587). In addition, the majority of residents anticipated using robotic surgery in their careers (62% juniors vs. 75% seniors, p 0.590). Two years after introduction of the elective RS curriculum, the percent completion rates were as follows (% juniors vs. % seniors): Part 1, 45.2% vs. 40% ; Part 2, 16.7% vs. 25%; Part 3, 4.8% vs 10% Part 4, 2.3% s vs. 10%; Part 5, 0% versus 10%. 31% of juniors residents were unaware that the curriculum existed, while 5% of senior residents never heard of the curriculum. With regards to operating, 33.3% of senior residents have operated at the console, as compared to 7.7% of junior residents, p 0.03.

Conclusions/Discussion: The majority of junior and senior GS residents believe that robotic surgery should be formally taught in residency and that robotic surgery will be useful post-residency. However, two years after introduction of an elective Robotic Surgery Curriculum, the majority

of residents had only completed Part 1 (i.e., the online modules). The level of completion did not vary based on residency level. These survey results served as the impetus to make the RS-curriculum a mandatory part of residency education. In the future, we will re-administer the survey to evaluate how implementation of a mandatory curriculum affects resident exposure and proficiency in robotic surgery.

Robotic Surgery Questionnaire

1.) I feel equipped to perform robotic surgery without any formalized training?

- Strongly agree
- Somewhat agree
- Neutral
- Somewhat disagree
- Strongly disagree

2.) How strongly do you agree with the following statements about the role of robotic surgery training in general surgery residency? (Strongly agree, somewhat agree, neutral, somewhat disagree, strongly disagree)

- Robotic surgery is an important part of surgical residency
- Participate using robotic surgery in my practice after residency
- I am interested in receiving robotic surgery training as part of my surgical curriculum

3.) Select the highest level of the Surgical Robotic Curriculum that you have completed thus far:

- None of them
- Part 1: Online modules
- Part 2: Robotic simulation training
- Part 3: On-site training
- Part 4: Four practice cases plus attending evaluations (10 cases plus evaluation forms)
- Part 5: Operating at the console (20 cases plus evaluation forms)

4.) How many robotic cases have you completed?

- None
- 1-5
- 6-10
- >11

Answer the following question if your response to question #3 was "C" or higher

5.) How helpful were the online training modules in familiarizing you with the da Vinci S Robotic Surgical System?

- Very helpful
- Somewhat helpful
- Not sure
- Somewhat unhelpful
- Not at all helpful

Answer the following question if your response to question #3 was "C" or higher

6.) How strongly do you agree with the following statements about the robotic simulation modules (Strongly agree, somewhat agree, neutral, somewhat disagree, strongly disagree)

- Easy to use
- Enjoyable to use
- Practicing was unnecessary
- Simulation seemed to be an adequate substitute for the operating room
- Not enough time in the work week to use
- Simulation improved my robotic skills

Answer questions 7-8 if your response to question #4 was "D" or higher

7.) Beside assistance: How comfortable are you performing each of the following? (Very comfortable, somewhat comfortable, neutral, somewhat uncomfortable, very uncomfortable)

- Selection of port placement
- Docking the robot
- Intraoperative beside assistance (positioning, retracting, etc)
- Operating at the console

8.) Console: Have you ever operated at the console during a robotic case?

- No
- Yes

9.) Have you ever obtained formal feedback from an attending after assisting or simulating a robotic case?

- No
- Yes

10.) Which of the following statements most closely reflects your perception of the role of robotic surgery in the field of General Surgery?

- It is the future of General Surgery procedures
- It will become more important in the future, but will not likely surpass laparoscopic procedures in importance
- It will become prevalent in community settings, but will not surpass laparoscopic procedures in prevalence at academic institutions
- It is primarily useful for genitourinary/urological procedures, but is not important in General Surgery
- None of the above

Figure 1.) General Surgery Resident Robotic Surgery Questionnaire

INJURY CHARACTERISTICS AND OUTCOMES OF PATIENTS WITH INFLAMMATORY BOWEL DISEASE AFTER TRAUMA: A PROPENSITY SCORE MATCHED ANALYSIS.

GS6

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Purpose/Background: Clinical course and outcomes of patients with inflammatory bowel disease (IBD) after trauma is largely unknown. Patients with IBD suffer from an imbalance of pro-inflammatory and anti-inflammatory cytokines that promotes inflammation and impedes healing, and they often require immune-modulating medication to control their disease. After trauma there is activation of a complex innate immune response which limits damage and promotes healing but can also contribute to post-injury complications and mortality. We sought to compare injury characteristics, clinical course, and outcomes of patients with IBD to those without IBD after trauma.

Methods/Interventions: We conducted a retrospective review of all adult patients (age ≥ 18 years) admitted to a level-1 trauma center from January 1, 2008 through October 1, 2015. Using the center's trauma database, 75 patients with inflammatory bowel disease were identified. Propensity score-matching analysis was conducted to find 4 control patients (N=275) for every case. Cases and controls were matched on age, sex, injury severity score (ISS) (1-8, 9-15, >16), and injury mechanism (motor vehicle collision, fall or other). Injury characteristics,

clinical course, and infectious and non-infectious complications were compared between cases and controls using unpaired t-tests and chi-squared analysis. Multivariable regression analysis was performed to identify significant associations of IBD with clinical course and outcomes after controlling for confounders.

Results/Outcome(s): Our study population had a mean age of 56 years and mean ISS of 15. 47% were female. Of the 75 patients in the IBD cohort, 44% had ulcerative colitis, 44% had Crohn's disease and 12% had indeterminate type. Half were on a 5-aminosalicylic acid, and 19% were on an immune-modulating medication on admission (5% thiopurine, 3% methotrexate, 9% anti-TNF, 1% on chemotherapy for breast cancer). 8% were on steroids. The IBD cohort had more Caucasians (88% vs. 66%, $p < 0.01$) and fewer black patients (9% vs. 27%, $p < 0.01$) and active smokers (15% vs. 26%, $p = 0.01$). More patients in the IBD cohort were on an immune modulator (19% vs. 2%, $p < 0.01$) or steroids (8% vs. 2%, $p = 0.02$) on admission. A larger percent of the IBD cohort had a history of prior abdominal (52% vs. 31%, $p = 0.01$) surgery, including bowel surgery (37% vs. 17%, $p < 0.01$) and history of ostomy (13% vs. 1%, $p < 0.01$). In those who had prior bowel surgery, the IBD cohort also had a greater mean number of prior bowel surgeries (1.6 vs. 1, $p < 0.01$). Despite matching based on overall ISS, the IBD cohort had fewer brain injuries (15% vs. 28%, $p = 0.02$) and higher mean admission Glasgow Coma Scale scores (15 vs. 14, $p < 0.01$), however they required more neurosurgical interventions (12% vs. 5%, $p = 0.03$). The IBD cohort also required more orthopedic surgeries (65% vs. 38%, $p < 0.01$) despite similar rates of upper ($p = 0.34$) and lower ($p = 0.39$) extremity injuries. There was no difference in baseline narcotic use between groups ($p = 0.19$), but the IBD cohort required more pain management consults during their admission (11% vs. 4%, $p = 0.04$). The IBD cohort spent more days in the intermediate care (IMC) unit (mean 2.2 vs. 1.1, $p = 0.03$), but had no difference in intensive care days ($p = 0.26$). With respect to complications, the IBD cohort had more abdominal complications including anastomotic leak, intra-abdominal abscess or surgical complication (4% vs. 1%, $p = 0.03$). After controlling for potential confounders with multivariable analysis, IBD was significantly associated with increased odds of operative intervention and neurosurgery in particular, pain management consult, venous thromboembolism and longer IMC and hospital stay (**Table 1**). In addition, patients on immune-modulating therapy had increased odds of requiring surgical intervention (aOR 4.54, 1.18-22.68, $p = 0.04$) particularly orthopedic surgery (aOR 6.78, 1.79-27.90, $p < 0.01$) and required more IMC days (aOR 2.53, 1.18-5.91, $p < 0.01$). There was no difference between cases and controls in infectious complications including urinary tract infection, bacteremia, pneumonia, surgical site infection, clostridium difficile infection or non-infectious complications including

ileus or obstruction, nonunion, unplanned reoperation or readmission or mortality.

Conclusions/Discussion: Patients with IBD have multiple baseline factors that may place them at higher risk than the general population for complications after trauma including higher rates of immune-modulating medications. We found more postoperative intra-abdominal complications in the IBD cohort. We also found that the IBD cohort had more orthopedic and neurosurgical interventions as well as pain management consults. Clinicians should consider these differences when caring for patients with IBD who present after trauma.

REDO ILEAL POUCH ANAL ANASTOMOSIS AFTER A FAILED POUCH IN PATIENTS WITH CROHN'S DISEASE: IS IT WORTH TRYING?

GS7

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Purpose/Background: Total proctocolectomy and ileal pouch anal anastomosis (IPAA) is the preferred surgical approach to ulcerative colitis (UC). Redo IPAA can be offered to selected patients in case of pouch failure. However, it is unknown if patients with Crohn's disease (CD) have a chance to avoid permanent diversion after failure of IPAA. **Aim:** to compare the outcomes of redo IPAA for UC and CD patients and define the indications for redo IPAA among patients with CD colitis.

Methods/Interventions: Patients who underwent redo IPAA with a primary surgical specimen diagnosis of UC or CD colitis were identified from a prospectively maintained IPAA database and complementary chart review from 1983 until 2017. Patients underwent index IPAA either at our institution or elsewhere. Redo IPAA was defined as anastomotic disconnection with IPAA reconstruction

with either the revised original pouch or after *de novo* ileal pouch creation. All redo IPAA were performed in three stages including initial diverting loop ileostomy, redo procedure and ileostomy closure. Patients diagnosed with indeterminate colitis were excluded. Pouch failure was defined as either pouch excision with end ileostomy or indefinite pouch diversion. Patient characteristics, perioperative and functional outcomes, pouch survival and quality of life using the Cleveland Global QOL score (CGQOL) were compared according to the diagnosis.

Results/Outcome(s): Out of 422 identified patients, 392 had UC and 30 had CD. Age, gender and body mass index (BMI) were comparable. Interval time between index and redo IPAA was significantly longer in the CD group compared to UC group (6.1[2.3,9.7] vs. 2.7[1.3,6.6] years, $p<0.01$). Indications for redo IPAA included anastomotic separation and fistulas [224 (60%) in UC and 23 (76.7%) in CD groups], chronic pelvic sepsis [38 (10%) in UC and 1 (3.3%) in CD], pouch outlet obstruction [81 (20%) in UC and 4 (13.3%) in CD] and pouch dysfunction [39 (10%) in UC and 2 (6.7%) in CD groups] and were similar between the groups ($p=0.63$). 135 (32%) patients had a combination of reasons for redo IPAA. Majority of redo IPAA required mucosectomy with handsewn anastomosis [255 (79%) in UC and 30 (100%) in CD groups, $p=0.23$]. New ileoanal pouch was constructed in 160 (41%) of cases in UC group with repair of old pouch in 231 (59%) of patients, while 25 (83%) of patients in CD had creation of new ileoanal pouch, and only in 5 (17%) of cases an old pouch was reanastomosed ($p<0.01$). 13 (3.3%) patients in UC group had conversion of pouch configuration from J to S to achieve a tension free IPAA anastomosis. Early postoperative morbidity was comparable between the groups. Stool frequency, seepage and fecal urgency were comparable between groups. However, cumulative 5-year pouch survival was significantly shorter in CD when compared to UC [55% (CI 30–79) vs. 88% (CI 83–92), $p=0.008$]. Major causes of redo IPAA failure of in CD

GS6 Table 1. Multivariable regression analysis results for outcomes that were significantly different between cases and controls.

Outcome	aOR	95% CI	p-value
Operative Characteristics			
Operative intervention required	3.76	1.90-7.62	<0.01
Mean number of operative trips	1.61	1.12-2.29	<0.01
Neurosurgery	6.32	1.75-23.74	<0.01
Other Surgery	3.32	1.35-8.15	<0.01
Non-Infectious Outcomes			
Venous Thromboembolism	93.27	3.35-15695.35	0.02
Pain management consult	3.03	1.08-8.26	0.03
Intermediate care days	1.88	1.20-3.00	<0.01
Hospital length of stay	1.75	1.32-2.33	<0.01

Adjusted odds ratios (aOR) provided are for the IBD cohort compared to controls. There was no significant association of IBD with any of the infectious outcomes after controlling for confounders.

were pouch fistulas and/or strictures occurring longer than 3 months after ileostomy closure, which were significantly more common in CD than in UC ($p < 0.001$, table) and ultimately led to permanent fecal diversion in 6 (20%) patients.

Conclusions/Discussion: Redo IPAA is a feasible salvage procedure for motivated patients with colonic CD. Patients should be counseled about high redo pouch failure rates and postoperative morbidity, mainly related to recurrent CD.

SURGICAL MORBIDITY IS IMPACTED BY ALTERATIONS IN BODY FAT DISTRIBUTION ASSOCIATED WITH NEOADJUVANT CHEMORADIATION FOR LOCALLY ADVANCED RECTAL CANCER.

GS8

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Purpose/Background: Body mass index (BMI) is an inconsistent predictor of surgical morbidity in cancer patients. We have previously shown that increased visceral obesity measured before neoadjuvant chemoradiation (NCR) is associated with post-operative morbidity in

patients with locally advanced rectal cancer (RC). We sought to evaluate the impact of NCR-associated alterations in body fat distribution on subsequent post-operative morbidity in patients with RC.

Methods/Interventions: 115 patients (64% white, 34% black, 2% other) underwent proctectomy for stage II/III RC after NCR. Body fat distribution at the L4/L5 level was measured by automated CT segmentation software and perinephric fat thickness was measured at the level of the left renal vein. Patients were classified as obese by BMI ($\geq 30 \text{ kg/m}^2$) and CT measures of adiposity included visceral fat area (VFA; $> 100 \text{ cm}^2$), visceral to subcutaneous fat area ratio (V/S; > 0.4) and perinephric fat thickness (PNF; $> \text{median}$). Complications were classified (Clavien-Dindo) as low (1-2) or high (3-4) grade. Change in measures of adiposity during NCR were analyzed as dichotomous (stratified by median) and continuous variables. Measures of adiposity at pre- and post-NCR time points and changes in these measures during NCR were evaluated for association with surgical morbidity and clinicopathologic factors using paired t-test, one-way ANOVA, Chi-square, and Fisher's exact test as appropriate. Mean income by zip code was examined as a surrogate for socioeconomic impact on outcomes.

Results/Outcome(s): Obese patients by adiposity measures at diagnosis (but not BMI) were more likely to be male by V/S (71.0% vs. 39.1%, $p = < 0.001$) and PNF (44.9%

GS7 Demographics, intraoperative details, postoperative morbidity and functional outcomes. Comparison of patients with ulcerative and Crohn's disease colitis after redo ileal anal pouch anastomosis

Variable	Ulcerative colitis (n=392)	Crohn's disease colitis (n=30)	p value
Age at redo IPAA, years	38.1±12.7	37.8±10.2	0.91
Gender, female	212(55.5)	21(72.4)	0.08
BMI, kg/m ²	24.2±4.5	23.7±4.5	0.66
Time to redo (years)	2.7[1.3,6.6]	6.1[2.3,9.7]	0.02
Early postoperative complications (within 30 days)			
Anastomotic separation	6(1.5)	1(3.3)	0.46
Pelvic sepsis	24(6.1)	2(6.7)	0.90
Anastomotic stricture	2(0.51)	0	0.99
Fistula	1(0.26)	1(3.3)	0.14
Hemorrhage	3(0.77)	0	0.99
Obstruction	6(1.5)	0	0.49
Late postoperative complications (past 30 days)			
Anastomotic separation	13(3.3)	-	0.31
Pelvic sepsis	3(0.77)	3(10.0)	<0.001
Fistula	5(1.3)	10(33.3)	<0.001
Pouch outlet obstruction	24(6.1)	18(60)	<0.001
Pouchitis	176 (44.8)	14 (45.5)	0.96
Overall postoperative morbidity	230(58.7)	26(86.7)	0.002
Quality of life, n = 293	7.0[6.0,8.0]	7.0[5.0,9.0]	0.52
5-year pouch survival (95% CI)	88 (83 - 92)	55 (30 - 79)	0.008
10-year pouch survival (95% CI)	87 (82 - 92)	55 (30 - 79)	0.01
Pouch failure at most recent follow up	30 (7.6%)	10 (33%)	0.03

vs. 17.4%, $p=0.002$). Pre-treatment VFA and PNF were associated with presence of the key metabolic comorbidities hypertension ($p=0.054$), diabetes ($p=0.011$) and hypercholesterolemia ($p=0.002$) while pre-treatment PNF ($p=0.027$) and VFA ($p=0.034$) were associated with presence and severity of postoperative complications respectively. BMI was not associated with presence or severity of complications. Mean income was not associated with presence or grade of complication. Loss of adiposity by VFA ($p=0.032$) following NCR was associated with the development of post-op complications. Degree of body mass lost was not associated with presence of comorbidities or postoperative complications by either categorical or continuous analysis.

Conclusions/Discussion: We have confirmed that pre-NCR visceral adiposity, but not BMI, is associated with presence of key metabolic comorbidities and severity of postoperative complications in RC patients treated with NCR and surgery. Furthermore, loss of visceral adiposity during NCR is associated with the development of postoperative complications. CT measures of visceral adiposity in RC patients may be superior to BMI for stratification of operative risk.

CHARACTERISTICS OF PATIENTS SEEKING SECOND OPINIONS AT A MULTIDISCIPLINARY COLORECTAL CANCER CLINIC.

GS9

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Purpose/Background: Patients seeking second opinions are a challenge for the colorectal cancer provider. These patients may have unusually complex cases, may have failed to establish a therapeutic relationship with an initial provider, or may be highly engaged patients exploring treatment options, or a combination of the above. We hypothesized that patient characteristics and treatment decisions would differ between patients seeking initial and second opinions in colorectal cancer care.

Methods/Interventions: We conducted a retrospective cohort study of patients seeking initial and second opinions at a large academic multidisciplinary colorectal cancer clinic (MCC). Prospectively collected data were analyzed for demographic, oncologic, and clinical characteristics. Initial opinion patients were compared to second opinion patients using Student's t-tests for continuous variables, Wilcoxon rank-sum for non-normally distributed continuous variables, and Chi-squared tests for categorical variables.

Results/Outcome(s): Of 1,351 colorectal cancer patients, 771 (57%) sought an initial opinion, 553 (41%) sought a second opinion, and 27 (2%) had incomplete records. As compared to initial opinion patients, second opinion patients were younger (mean age (SD) 60 (13) vs 62 (14) years, $p=0.002$), travelled farther (median distance

traveled 52 (interquartile range 26-99) vs 29 (IQR 14-77) miles, $p<0.001$), were more likely to have private insurance (51% vs 43%, $p=0.045$), and were more likely to have recurrent cancer (15% vs 8%, $p<0.001$). Initial and second opinion cohorts were similar in terms of gender, race, and proportion of colon versus rectal cancer. Second opinion patients were assessed for case complexity. Patients seeing medical oncology for a second opinion were more likely to have stage IV disease (47% vs 34%, $p=0.001$). Second opinion patients with rectal cancer were more likely to present at Stage I (13 vs 10%, $p=0.035$) and Stage IV (37% vs 29%, $p=0.035$) compared to initial opinion patients. Among patients seeking a surgical consultation, rectal cancer was more prevalent than colon cancer in the second opinion versus the initial consultation group (55% vs 42%, $p=0.001$). The proportion of patients ultimately receiving care at the MCC varied for second opinion vs initial consultation by specialty consulted: 27% vs 54% for medical oncology ($p<0.001$), 19% vs 41% for radiation oncology ($p=0.006$), and 39% vs 72% for surgery ($p<0.001$). Overall, 173 (31%) of second opinion patients transitioned their care to the MCC and patients who travelled a shorter distance were more likely to receive their care at the MCC (median distance travelled 37 (IQR 20-79) vs 62 (IQR 30-104) miles, $p<0.001$).

Conclusions/Discussion: Patients seeking a second opinion represent a unique subset of colorectal cancer patients. In general, they are younger, better insured, have traveled farther, and more likely to have recurrent disease than patients seeking an initial opinion. Disease complexity appears to motivate patients to seek second opinions: for example, patients seeing medical oncology for second opinions are more likely to have advanced stage disease, and patients seeing surgery for second opinion are more likely to have rectal cancer. Although transfer of care to an MCC after second opinion is lower than for initial consultations, MCCs provide an important role for patients with complex disease characteristics and treatment needs, who travel farther for consultation.

METFORMIN AS AN ALTERNATIVE TO 5FU AS RADIOSENSITIZER FOR RECTAL CANCER MANAGEMENT - RESULTS OF IN VITRO AND IN VIVO TREATMENT OF COLORECTAL CANCER CELL LINES.

RF1

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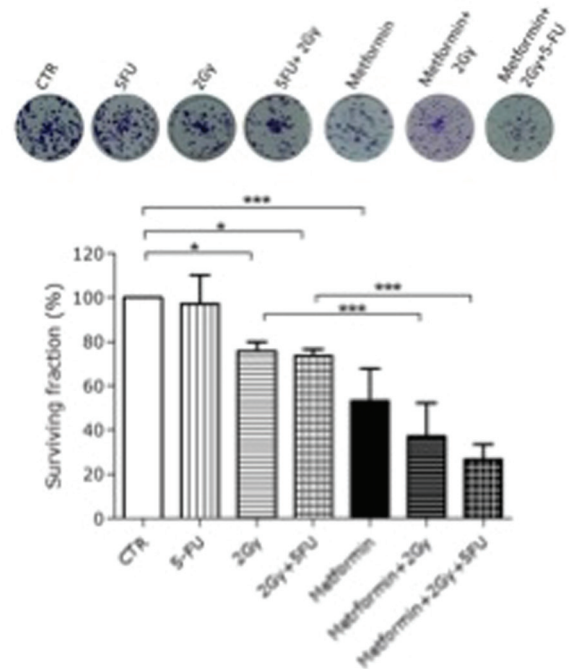
Purpose/Background: Neoadjuvant chemoradiation has been widely used in the treatment of locally advanced rectal cancer, with tumor response rates being directly related to the amount of radiation and chemotherapy delivered. Although the radiosensitizer 5-fluoruracil (5FU)

enhances tumor response rates to radiation therapy, it also increases treatment-related toxicity. Recent studies have demonstrated that Akt-activation plays a significant role in tumor resistance to chemoradiation. Akt-inhibitors have been shown to increase tumor sensitivity to radiation therapy *in vitro* and *in vivo*. The purpose of the present study is to demonstrate the effects of metformin in tumor response *in vitro* and *in vivo* as an alternative to 5FU in enhancing tumor response by inhibition of Akt activity.

Methods/Interventions: SW480 (RT-resistant) colon cancer cell line was cultured and plated for clonogenic assays. After 24 hours, cells were treated with Metformin alone, RT alone (2Gy), RT/5FU, RT/metformin and RT/5FU/Metformin. Colony formation was accessed 15 days after treatment and quantification was performed with a colorimetric densitometer (Infinite® 200 PRO). In addition, *in vivo* experiments were carried out in nude mice. An inoculum of 5×10^6 SW480 cells/100 ul of PBS was injected subcutaneously into the right dorsal flanks. Treatments started two weeks after inoculation of cells. Mice were treated by Metformin alone, RT/Metformin, RT/5FU and RT/Met/5FU. After the initiation of the treatment, the tumors were measured with an external caliper three times a week and tumor volume was calculated by the formula $0.52 \times A \times B^2$, where in A represents the long axis and B represents the short axis of the tumor. Final measurements were performed at 5 weeks from treatment completion.

Results/Outcome(s): Colony formation efficiency was significantly reduced when treated by radiation alone (76%) compared to untreated control ($p < 0.05$). The addition of 5FU to radiation led to similar decreases in colony formation efficiency (76% vs. 74%; $p > 0.05$). Colony formation efficiency was significantly reduced when treated by metformin alone (53%) when compared to untreated control ($p < 0.001$). The addition of metformin to radiation led to a further decrease in colony formation efficiency, however, not statistically significant (53% vs. 37%; $p > 0.05$). Combination of 5FU, metformin and radiation together led to no significant decrease in colony formation efficiency compared to RT/Metformin (27% vs 37%; $p > 0.05$) *In vivo* assays indicated that metformin alone was capable of reducing tumor volume by 44% ($p < 0.05$) compared to untreated controls. There were no differences in tumor volume reduction comparing metformin alone to RT/Metformin, RT/5FU or RT/5FU/Metformin ($p > 0.05$).

Conclusions/Discussion: Metformin appears to have an additive, but not synergic, antiproliferative effect when combined with radiation/5FU, suggesting distinct molecular pathways for metformin and 5FU in sensitizing tumor cells for radiation. Future studies should consider Metformin as an alternative to 5FU in an attempt to enhance tumor sensitivity to radiation therapy and avoid the significant toxicity associated with 5FU in the setting of neoadjuvant chemoradiation therapy for primary rectal cancer downstaging.



Evaluation of the cell survival and proliferation effect in SW480 cells. Illustrative image of an assay following the graphic representation. Metformin (0.7 mM) exerts an additive effect to treatment with 5-FU and radiation. The assay was performed in duplicate techniques from four independent experiments and analyzed by colorimetric densitometry. Statistical analysis was performed with the One way ANOVA with Tukey post-test (* $p < 0.05$ *** $p < 0.001$).

THE RADIATION-INDUCED SENESCENCE-ASSOCIATED SECRETORY PHENOTYPE OF COLORECTAL FIBROBLASTS STIMULATES COLORECTAL CANCER STEM CELL PROGRESSION.

RF2

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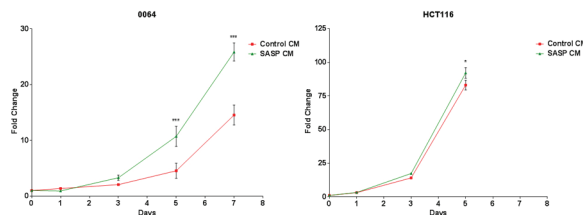
Purpose/Background: The tumor microenvironment (TME) is a complex arrangement of multiple components that affect tumor biology, such as fibroblasts, immune cells, and signaling molecules. Radiation affects both colorectal cancer epithelium as well as the tumor microenvironment (TME). Radiation-induced DNA damage can promote senescence of fibroblasts in the TME, resulting in a dramatic alteration in the types and quantity of cytokines secreted by the senescent cell. The subsequent inflammatory senescence associated secretory phenotype (SASP) interacts with other cellular components of the tumor including cancer stem cells (CSCs). It is well-established that CSCs represent a radiation-resistant subset of cancer cells, providing a possible link between SASP and radiation resistance in colorectal cancer. We hypothesized that radiation-induced SASP from the TME would stimulate

cancer stem cell proliferation, hence contributing to radiation resistance.

Methods/Interventions: Cells from freshly dissociated patient tumors were sorted by flow cytometry (FACS Aria II) for colorectal cancer stem cell markers (CD44). In our laboratory, CD44⁺ cells have previously been demonstrated to have CSC characteristics such as the ability to form tumor spheres, radiation resistance, and the ability to recapitulate a colorectal tumor. Colorectal fibroblasts were isolated from human colon or rectum and cultured in DMEM with 20% FBS and penicillin/streptomycin (P/S) at 37°C and 5% CO₂. Senescence of fibroblasts was assessed at 3, 6, 10 and 13 days after exposure to 10 Gy and assessed by immunohistochemical analysis of X-gal expression. Fibroblasts were seeded into 6-well plates, and 24 hours later, cells were exposed to 0 Gy (control) or 10 Gy of ionizing radiation. On Days 0, 3, 6, 10, and 13, the media was removed and replaced with serum-free DMEM and P/S. 24 hours later, the serum-free DMEM (conditioned media) was removed, frozen at -80°C, and replaced with DMEM containing 20% FBS and P/S. HCT116 (a colorectal carcinoma cell line) and 0064 (a patient-derived cancer stem cell line) were treated with SASP-conditioned media from irradiated fibroblasts and viability was assessed with CellTiter-Glo®. The secretory profile of conditioned media was assessed by cytokine array (RayBio®).

Results/Outcome(s): Colorectal fibroblasts exposed to 10 Gy ionizing radiation demonstrated increased X-gal expression compared to non-irradiated fibroblasts as early as three days after radiation. Senescence increased to nearly 100% of cells by Day 6, an effect that was sustained through 13 days after irradiation. SASP-conditioned media induced a statistically significant difference in cell viability of CSCs at days 5 and 7 compared to control conditioned media (fold change 10.7 vs 4.6, 25.8 vs. 14.5, respectively, $p < 0.001$); figure. To determine if this phenomenon was unique to CSCs or if colorectal cancer cells were also similarly affected, HCT116 cells were treated with SASP-conditioned media. Similarly, but not as prominent, there was a statistically significant increase in fold change in cell viability at Day 5 compared to control conditioned media (92.1 vs. 83.0, $p < 0.05$); figure. Of the 120 cytokines assessed from the conditioned media, 73 were unchanged or increased 11 days after exposure to 10 Gy ionizing irradiation, when the fibroblasts were senescent. The largest fold change in the SASP was seen in ILG-BP-6, GITR, GRO α , IL8 and IL-6, which all increased by four-fold or more.

Conclusions/Discussion: Radiation causes fibroblasts to enter senescence and secrete inflammatory cytokines which stimulate proliferation of CSCs. Further characterization of the components of SASP and their interaction with CSCs is in progress and could identify potential targetable mechanisms to increase radiation effectiveness for rectal cancer.



Cell viability of CSCs (0064) and colorectal cancer cells (HCT116) after treatment with conditioned media from irradiated fibroblasts.

GLACIAL ACETIC ACID-INDUCED ULCERATIVE COLITIS LESIONS IMPROVE AFTER ORAL CALCIUM CARBONATE NANOPARTICLE THERAPY IN A RAT MODEL.

RF3

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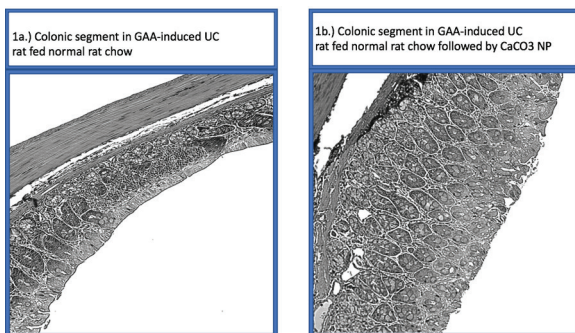
Purpose/Background: Ulcerative colitis (UC) is a type of inflammatory bowel disease (IBD) characterized by relapsing and remitting episodes of inflammation. Existing pharmacological and surgical therapies have adverse effects, making alternative options essential. Nanoparticles, structures designed on the range of 1-100 nm, can be linked to drug compounds for targeted colonic delivery. In this study, we evaluate how calcium carbonate nanoparticles (CaCO₃ NP) fed to rats promote colonic healing after drug-induced colitis via calcium sensing receptor (CaSR) activation. The CaSR has two large exofacial lobes that sit in the extracellular environment and bind to calcium ligands in the mammalian colon. Activation of the CaSR has been found to promote epithelial regeneration, while knockout mice have altered intestinal barrier function. Here, we demonstrate CaSR's putative role in the recovery of ulcerative colitis through oral nanoparticle delivery and receptor activation.

Methods/Interventions: All handling of animals and experiments followed guidelines established by the Institutional Animal Care and Use Committee at Yale. Male Sprague-Dawley rats were anesthetized with inhaled isoflurane, while providing them with an enema containing 2% of GAA dissolved in glycerin. Animals were then housed in climate and humidity-controlled cages and fed 1.5 oz of DietGel for 7 days, representing a balanced murine diet. From days 8-14, the experimental rats were fed 5 mM CaCO₃ NP dissolved in DietGel, while control rats continued to eat DietGel alone. Additional control groups included rats without the enema treatment, fed either DietGel alone or DietGel treated with 5 mM CaCO₃ NP. After two weeks, all animals were euthanized with an isoflurane overdose to harvest their distal colons for H&E staining and histological analysis.

Results/Outcome(s): GAA-induced ulcerative colitis was graded by the loss of crypt height and presence of inflammatory markers. After providing calcium carbonate nanoparticles in the rat diets after 2% GAA-induced

ulcerative colitis, there was a robust recovery of the villi height, when compared to the controls fed regular chow for the full 14 days. These animals provided with DietGel alone showed crypt effacement with persistent signs of inflammation on H&E staining (Figure 1a,b). It was also observed that animals that ingested DietGel with nanoparticles without an induced insult showed greater growth of villi in their colonic segments. Experiment and control colonic tissues are currently being scored in a blinded experimental setup by university pathologists.

Conclusions/Discussion: Oral calcium carbonate nanoparticles show the capacity to reduce the time needed to recover from the inflammatory state in GAA-induced ulcerative colitis in the vivo rat model through the activation of the CaSR. Calcium nanoparticles also promoted villi growth in colons that were not pretreated with GAA enemas. These findings offer the possibility of using oral calcium nanoparticles as an alternative to other ulcerative colitis treatments. In the future, we will evaluate whether prophylactic calcium nanoparticle treatment can reduce or prevent inflammation before the onset of the colitis injury.



INVESTIGATING EXOSOMAL MIRNAS AND PROTEINS DERIVED FROM COLORECTAL TISSUE AND PLASMA IN THE PROGRESSION OF COLORECTAL CANCER.

RF4

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Purpose/Background: Colorectal Cancer (CRC) is the third deadliest cancer worldwide with 135,000 new diagnoses annually, accounting for 8% of all new cancer cases. This can be attributed to late diagnosis as the 5-year survival rate for stage IV metastatic CRC is at approximately 14%. Fortunately, early diagnosis and treatment brings the survival rate to approximately 93%, so investigation on early-CRC diagnostic techniques is crucial. The past decade has seen many studies on extracellular vesicle (EV) and particularly exosome involvement in disease progression. There are various molecules

transported by these nanovesicles, including micro RNAs (miRNAs), which are small non-coding RNAs that can alter gene expression in CRC by targeting mRNA. The miRNA profile of CRC has been shown to be dysregulated throughout the different CRC stages. However, current miRNAs associated with CRC suffer from high false-positive rates and thus cannot be used as a biomarker for tracking CRC progression. Therefore, this study aims to use a Next Generation Sequencing (NGS) approach which allows the sequencing of millions of small fragments of DNA in parallel to identify novel exosome miRNAs to track the progression of CRC.

Methods/Interventions: A total of 84 samples from 28 CRC patients from stage I to stage IV were studied (plasma, CRC tissue, and adjacent normal tissue, each n=28). Plasma exosomes were isolated via differential and ultracentrifugation and then quantified using the NanoSight NS500. Their morphology was determined by transmission electron microscopy. The presence of exosomal markers were assessed by Western Blot. We used the Illumina NextSeq 500 for NGS on the miRNA within exosomes. The protein profile of each patient sample set was determined using Mass Spectrometry (MS). We performed linear mixed modelling (LMM) to determine miRNA and protein profile changes across CRC stages for tissue and exosomes. Statistically significant differences in miRNA expression across CRC cancer stages, and between normal and CRC tissues was determined using likelihood ratio tests.

Results/Outcome(s): A total of 425 significant miRNAs were found to be differentially expressed when comparing normal tissues to CRC tissues across stages I to IV. Also, analysis of circulating plasma exosomes revealed 42 significant miRNAs that changed across CRC stage progression. A total of 11 of these miRNAs were expressed in both tissue and exosomes. Gene target analysis showed that these 11 candidate miRNAs are involved in biological processes vital to the progression of cancer disease, such as metabolism, communication, angiogenesis, and apoptosis. Of this group, bioinformatics analysis identified hsa-miR-7975, and found that its expression was generally higher in cancer tissue versus adjacent normal tissue in early stages of CRC, and also potentially targets gene ACVR1.

Conclusions/Discussion: We established that exosomes are smaller vesicles 30nm - 100nm in size with cup-like morphology that express exosomal markers TSG101 and CD9. We identified a specific set of miRNAs dysregulated in cancer tissues as well as in the circulating exosomes. However, the miRNA expression levels differ between tissues and exosomes. Specifically, we identified miR-7975 which has been shown to target the ACVR1 gene and is a novel miRNA in CRC. Proteomic analysis was unable to detect the presence of ACVR1 protein in the samples, however, it identified 2 mutual proteins in exosome and tissue samples, one of which has not previously been

reported to be involved with CRC. We suggest that screening for multiple exosome types and their content can potentially track the progression of CRC. The 11 identified miRNAs including novel miRNA miR-7975 could potentially be used as circulating biomarkers for CRC progression, and will be investigated in further validation studies.

COLITIS-ASSOCIATED CANCER PRIMARY ORGANOID DEMONSTRATE STEMLIKE PHENOTYPE AND FUNCTION.

RF5

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Purpose/Background: Background. Colitis-associated cancer (CAC) is a feared consequence of long-term inflammatory bowel disease. The pathogenesis of CAC is poorly understood, and challenges to the delineating the pathogenesis include a lack of 3D *in vitro* human models. However, new approaches have enabled *in vitro* isolation and propagation. With these technologies, the cancer stem cell hypothesis suggests that epithelia enriched for certain markers have the property of self-renewal. We hypothesized that primary epithelial organoids from CAC would express markers consistent with primary CAC tissues, and, when enriched for the cancer stem cell marker, aldehyde dehydrogenase (ALDH), would demonstrate self-renewal.

Methods/Interventions: Methods. CAC-derived epithelia were isolated and cultured in Matrigel beads sustained by media from cells secreting Wnt3a, Noggin, and R-spondin. Immunohistochemistry (IHC) was used to compare primary CAC tissues to primary epithelial organoids for the stem cell markers aldehyde dehydrogenase and CD44. At least 500 nuclei/sample were enumerated. Unpaired t-tests were used to compare the IHC between the tissues and the organoids. The Aldefluor[®] assay was used to enrich for epithelia with a stemlike phenotype. *In vivo* limiting dilution assay is the gold standard test of self-renewal. Aldefluor^{high} subpopulations in the heterotopic flank position were evaluated.

Results/Outcome(s): Results. The CAC-derived epithelial organoids were propagated under standard conditions (N = 5) over multiple passages. The expression of stem cell markers CD44 and ALDH strongly phenocopied that of the primary tissues and was much greater in CAC vs. normal vs. UC (N ≥ 4, p < 0.001). *In vivo* limiting dilution assays revealed the incidence of the tumor initiating cell to have a frequency of 2.5-fold over Aldefluor^{low} tumor initiating cell populations (N = 2; Chi-sq p < 3.65 x 10⁻⁵).

Conclusions/Discussion: Conclusions. CAC-derived 3D human organoids are able to be propagated. The tumor initiating cell marker, ALDH, is increased in these

CAC organoids. *In vivo* limiting dilution analyses demonstrate that ALDH is a marker for enrichment of cancer stem cells. These organoids may now be used to increase understanding of the pathogenesis of CAC, and to advance precision medicine.

INSTITUTIONAL VALIDATION OF A READMISSION RISK CALCULATOR FOR ELECTIVE COLORECTAL SURGERY.

RF6

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Purpose/Background: Hospital readmissions reflect adverse patient outcomes and constitute a considerable financial burden to the healthcare system. Unplanned readmissions are an increasingly important target for intervention, and reimbursement penalties can be incurred by hospitals with excess readmissions. While multiple models exist to estimate patient morbidity and mortality, clinicians lack accurate models to predict readmission. We previously created a readmission risk model for use on the day of discharge using the American College of Surgery National Surgical Quality Improvement Program (ACS NSQIP) database and here have validated the tool on an institutional scale.

Methods/Interventions: Patients >18 years old patients who underwent elective abdominal colon or rectal resection in the participant user file from 2012-2014 ACS NSQIP data were identified for inclusion using Current Procedural Terminology codes. The primary outcome was readmission within 30 days of surgery. Based on pre-operative patient characteristics, perioperative factors, and post-operative occurrences, multivariable logistic regression was used to create a readmission risk calculator that stratified patients into low, moderate, and high-risk tertiles. The model was validated via a retrospective review of elective colon and rectal resections from 9/2016-6/2018 at a single academic institution. Based on an a priori power calculation using the created multivariable logistic regression model, 400 patients needed to be analyzed to validate the model with a 95% confidence interval. Data on institutional patients consisted of patient demographics, operative details, and the specifics of readmission within 30 days of surgery. In addition, emergency department visits and frequency of provider interactions (telephone calls and clinic visits) prior to readmission were analyzed. Finally, the risk index was transformed into an online risk calculator and the institutional data was entered.

Results/Outcome(s): The risk calculator was created based on a 60% random sample of 85,097 patients from ACS-NSQIP and showed a readmission rate of 11.1% (see variables in Figure 1a). The model discrimination (c-statistic) in the original 60% NSQIP cohort was 0.75

($p=0.00$). In the 40% NSQIP validation sample, the c-statistic was 0.70 ($p=0.00$). In the highest tertile, 13% were readmitted. Median interval from surgery to readmission was 14 days (IQR 9-20). The most common reasons for readmission in NSQIP database were organ space infection, bowel obstruction/paralytic ileus, and dehydration. For institutional validation, 400 patients were analyzed, and the overall 30-day readmission rate was 9% (35 patients). Median interval to readmission was 11 days from surgery (IQR 8-18 days) and 4 days from discharge (IQR 3-11 days). The most common reasons for readmission were the same as in the NSQIP population. Upon readmission, 28 (80%) were readmitted to a surgical service. The median length of readmission was 3 days (IQR 2-6 days). Three patients required a bedside drainage of superficial surgical site infection, four required percutaneous drainage, and one required surgery. Prior to readmission, 16 patients spoke with a provider on the phone, and 9 were evaluated in clinic. Predicted and observed readmissions showed close correlation with a c-statistic of 0.63 ($p=0.02$, Figure 1B). Based on the model-generated tertiles, 4.8% of patients in the lowest tertile were readmitted, 7.3% in the middle tertile, and 13.8% of the highest tertile. In addition, the model was evaluated for its ability to predict emergency department visits. In the institutional patient cohort, there were 57 patients (14%) who visited the emergency room within 30 days post-operatively with a median interval of 12 days (IQR 8-18); 65% of those who visited the emergency room were readmitted. The model was able to predict emergency room visits with a c-statistic of 0.62 ($p=0.01$).

Conclusions/Discussion: A readmission risk calculator for elective colorectal surgery was created using NSQIP data, and validated using historical institutional patient data. This study demonstrates that the calculator, when utilized at the institutional level, could be used on day of discharge to target patients for intervention of modifiable risk factors, extension of inpatient treatment, or more intensive outpatient follow-up. Next, this model will be tested prospectively and will ultimately be disseminated for public use.

Readmission risk factors	Odds ratio	95% CI	Risk Score
Pre-operative factors			
Diagnosis of inflammatory bowel disease	1.41	(1.28-1.56)	5
ASA class 3 or higher	1.42	(1.34-1.52)	5
Creatinine 2 or higher	1.81	(1.49-2.19)	8
Myocardial infarction within 6 months of surgery	2.61	(1.94-3.52)	14
Peri-operative factors			
Total operative time, per additional hour	1.04	(1.02-1.05)	1
Ileostomy	1.43	(1.33-1.55)	5
All procedures except partial colectomy without stoma	1.55	(1.44-1.67)	6
Post-operative factors			
Hospital length of stay less than 8 days	1.86	(1.72-2.01)	9
Surgical site infection			
Superficial	2.68	(2.42-2.96)	14
Deep	5.77	(4.90-6.79)	25
Organ space	7.07	(6.35-7.86)	28
Urinary tract infection	2.79	(2.43-3.20)	14
Return to operating room	2.97	(2.66-3.31)	15
Deep venous thromboembolism requiring therapy	4.06	(3.35-4.92)	20
Pulmonary embolism requiring therapy	4.80	(3.67-6.27)	22
Cardiovascular accident / stroke with neurological deficit	5.08	(3.29-7.86)	23

Figure 1A: Readmission Risk Model for Elective Colorectal Surgery. Pre-operative, peri-operative and post-operative factors with corresponding risk scores.

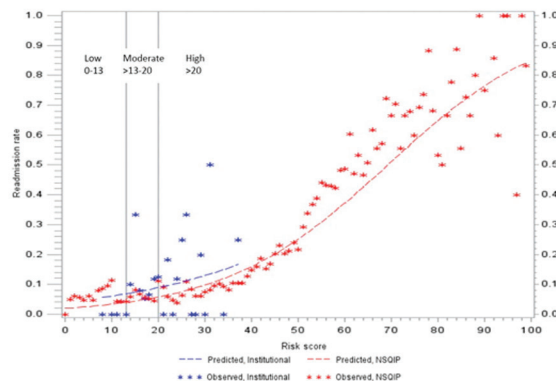


Figure 1B: Observed and Predicted Readmissions for Institutional and NSQIP data. Each data point represents observed readmission rate for individual risk scores. Institutional data represented in blue and NSQIP data represented in red.

“REAL WORLD” ADHERENCE TO AN ERAS PATHWAY AT A TERTIARY MEDICAL CENTER: RESULTS AND QUALITATIVE ANALYSIS OF PATTERNS IN PROVIDER NON-ADHERENCE TO AN ERAS PATHWAY.

RF7

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Purpose/Background: Implementing Enhanced Recovery after Surgery (ERAS) pathways in colorectal surgery improves patient outcomes. However, adoption of and adherence to ERAS pathways is neither immediate nor universal across all practitioners. Prior studies have demonstrated that adherence to ERAS pathways varies by setting (preoperative vs postoperative) as well as provider. Our aim was to assess both preoperative and postoperative provider adherence to a modern ERAS pathway in an academic colorectal surgery department, and to identify obstacles perceived by care team members that prevent pathway adherence during the postoperative period.

Methods/Interventions: All patients undergoing elective colon or rectal resection between January and September 2018 within the Division of Colon and Rectal Surgery in a tertiary academic medical center were included. Adherence to individual elements of the ERAS pathway was assessed by reviewing physician,

nursing, and pharmacy records. Physician and nursing staff who had participated in post-colectomy patient care were surveyed on their knowledge of the elements of the pathway, the degree of difficulty adhering to individual pathway elements, and their impression of specific obstacles to achieving maximum adherence. Non-elective surgeries, proctectomy without colonic resection, procedures performed with another surgical service, non-English speaking patients, and patients enrolled in research studies precluding standard ERAS care were excluded.

Results/Outcome(s): During the study period, 234 elective colon or rectal resections were performed and 166 patients were deemed eligible for the study. Indications for resection included malignancy (73%), inflammatory bowel disease (IBD) (11%), and benign disease (16%). 94% of cases were performed laparoscopically and 2% were converted to open; 4% were planned open cases. Preoperatively, 85% of patients reported adherence to prescribed bowel regimen and 75% reported consuming carbohydrate gels. 84% of patients received acetaminophen and 61% received gabapentin or pregabalin preoperatively as part of an opiate sparing pain regimen. Perioperatively, heparin was administered in 95% of patients. Prophylactic antibiotics were administered in 100% of patients. Intraoperatively, patients received a median of 1.3L [IQR 0.95 – 1.7] of intraoperative intravenous fluid (IVF). Postoperatively, a median of 5.1L [IQR: 3.6 – 6.6L] total IVF was received through postoperative day (POD) 2. Maintenance IVF was terminated on POD 1 for 61% of patients. Only 47% had maintenance IVF terminated within 4 hours of adequate oral fluid intake. 28% of patients received oral fluids on POD 0, and 32% were prescribed a regular diet on POD1. Administration of maximum available doses of ketorolac on POD 0 was achieved in 49% of patients, declining to 16% by POD 2. Documented reasons for non-adherence included low urine output or AKI (22%), pending discharge (14%), concern for bleeding (5%), and patient refusal (4%). Rationale for deviation was not documented in 78% of instances in which it occurred. Administration of maximum doses of acetaminophen on POD 0 was achieved in 80% of patients, declining to 43% by POD 2. Combined, maximal dosing of opiate-sparing pain medications was significantly more likely to be given on POD 0 than POD 1 OR 1.7 (95% CI 1.2-2.3), and on POD 1 than POD 2 OR 2.5 (95% CI 1.8-3.5). 68% of patients underwent early ambulation on POD 1 and Foley catheters were removed by POD 2 in 80% of cases. DVT prophylaxis with subcutaneous heparin was given in 100% of patients on both POD 1 and POD 2. Median postoperative length of stay was 3 days [IQR 2 – 5]. When surveyed, both residents and nurses noted variability between surgeon and surgical services, as well as a lack of clear understanding of the ERAS pathway, as major barriers to adherence. Other practitioners (72%) rather than available pathway documents (32%) or pre-populated order-sets (28%) were

listed as common reference source for the knowledge of the ERAS pathway.

Conclusions/Discussion: Non-adherence to ERAS elements occurred more frequently in the postoperative period than the preoperative or intraoperative periods. Self-reported provider lack of knowledge of the ERAS pathway and variability between individual surgeons and surgical services are perceived major barriers to adherence. These results demonstrate that adherence to an ERAS pathway under elective conditions is lower than previously thought, and can serve as a basis for targeted future education and quality improvement initiatives.

TABLE 1: Provider adherence to elements of ERAS-inspired pathway

ERAS element	Definition	Current Adherence n (%) unless otherwise noted
Total number of patients		
166 (100)*		
Preoperative		
Pre-operative bowel regimen	Patient reported taking prescribed pre-operative bowel prep in pre-op holding, or was admitted overnight for bowel prep	139 (85)
Pre-operative carbohydrate gel consumption	Patient reported taking carbohydrate gel the evening before surgery and/or the morning of surgery	121 (75)
Pre-operative opiate sparing analgesia	Administration of acetaminophen in preoperative holding area Administration of gabapentin or pregabalin in preoperative holding area	140 (84) 101 (61)
Pre-operative DVT prophylaxis	Subcutaneous administration of heparin in preoperative holding area	156 (95)
Intraoperative		
Intraoperative antibiotic administration	Administration of cefazolin and metronidazole or appropriate alternatives	166 (100)
Sparing use of IV fluids	Minimization of intraoperative IVF administration (ccs) [Median (IQR)]	1300 (950-1650)
Postoperative		
Early mobilization	Ambulating POD 1	112 (66)
Early termination of mlVF	mlVF terminated POD1 mlVF terminated within 4 hours of PO fluid intake \geq 300ccs Minimization of IVF POD0-2 (ccs) [Median (IQR)]	102 (61) 76 (47) 5101 (2608-6594)
Early PO fluid and nutrition intake	Oral fluids POD 0 Regular diet POD 1	45 (28) 53 (32)
Early termination of urinary catheter	Foley removed POD 1 All Cases Non-Pelvic Cases	127 (80) 105 (83)
Opioid sparing analgesia	Maximum administered doses of ketorolac, POD0-2 Maximum administered doses of acetaminophen, POD0-2	Ketorolac POD0: 81 (49) POD1: 58 (35) POD2: 26 (16) Acetaminophen POD0: 132 (80) POD1: 112 (67) POD2: 69 (43)
DVT prophylaxis	Subcutaneous administration of heparin, enoxaparin, or home anticoagulation regimen	POD1: 166 (100) POD2: 162 (100)

POD = postoperative day; mlVF = maintenance IV fluid. *total number of patients = 162 on POD2 due to patients discharged POD1.

PREDICTORS OF LYMPH NODE METASTASES IN PATIENTS WITH MALIGNANT ADENOMATOUS POLYPS OF THE COLON.

S1

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Purpose/Background: The optimal management of malignant adenomatous polyps of the colon is unclear and the identification of high-risk patients who may benefit from formal surgical resection remains challenging. Although traditional predictors of lymph node positivity such as polyp morphology and histologic markers have provided some guidance, the risk of lymph node dissemination with malignant polyps has not been well described. We sought to identify predictors of lymph node positivity in patients with malignant adenomatous polyps using a large cancer specific dataset.

Methods/Interventions: The National Cancer Database (2004-2015) was queried for all patients with malignant colon polyps who underwent formal colonic resection. Malignant polyps were defined as T1 adenocarcinomas within an adenomatous polyp, ≤ 5 cm, and without evidence of metastatic disease. Demographic factors (age, sex), clinical factors (tumor size, location, CEA level), and pathologic factors (lymph node status, grade, lymphovascular invasion [LVI], perineural invasion [PNI], and microsatellite instability [MSI]) were described. Tumor size was categorized into 5 groups (0-5, 6-10, 10-15, 16-20, and 21-50 mm). Age was categorized into <50, 50-64, and ≥ 65 years. Tumor location was categorized as right, transverse or left sided. Grade was categorized as low (well or moderately differentiated) or high (poorly differentiated or anaplastic). MSI was categorized as MSS/MSI-L vs. MSI-H. Univariate and multivariate methods were used to determine independent predictors of lymph node positivity. Interaction analyses were performed. Subsets of patients with very low risk and very high risk of nodal positivity were identified.

Results/Outcome(s): A total of 24,044 patients were identified who met all inclusion criteria. Of these, 50.3% were male. The majority of patients had low grade histology (93.4%). CEA level was elevated in 17% and 94.8% of patients had MSS/MSI-L tumors. LVI and PNI were present in 9.4% and 1.2% of tumors, respectively. Lymph node disease was present in 8.6% of patients overall. High grade, LVI, PNI, younger age, and left sided tumor location were all univariate predictors of lymph node disease, while MSI and CEA were not associated with lymph node status. On multivariate logistic regression analysis, high grade (OR 2.23), left sided tumor location (OR 1.16), LVI (OR 4.95) were independently predictive of lymph node positivity, while elderly age (≥ 65 years) (OR 0.36) was highly protective (all p values <0.01). The subset of patients that were ≥ 65 years with low grade disease of the right or transverse colon and without LVI had a 4.5% risk of lymph node positivity, while all others combined had a 9.6% risk. Conversely, patients with all identified risk factors (LVI, non-elderly age, high grade, and left sided tumors) had a 30% risk of lymph node positivity.

Conclusions/Discussion: Patients with malignant polyps have a significant risk of lymph node disease. Independent predictors of lymph node disease include non-elderly age, left sided tumor location, LVI and high-grade histology. In the absence of all of these factors, lymph node positivity is low but still significant. These data can be used to guide clinical decision making for recommending formal surgical resection in patients with malignant polyps.

Risk Factors	Lymph Node Status		P value
	Negative (n=21,476)	Positive (n=2,026)	
Sex			0.001
Female	10,608 (90.8%)	1078 (9.2%)	
Male	10,868 (92.0%)	948 (8.0%)	
Grade			<0.001
Low Grade	18,724 (92%)	1,629 (8.0%)	
High Grade	1,147 (79.7%)	292 (20.3%)	
Lymphovascular Invasion			<0.001
Absent	11,195 (93.5%)	782 (6.5%)	
Present	859 (69.2%)	382 (30.8%)	
Perineural Invasion			<0.001
Absent	11,781 (91.1%)	1150 (8.9%)	
Present	119 (74.4%)	41 (25.6%)	
Tumor Location			<0.001
Right	10,853 (92.1%)	935 (7.9%)	
Transverse	1,960 (94.1%)	122 (5.9%)	
Left	8,250 (89.8%)	935 (10.2%)	
Age (years)			<0.001
<50	1,308 (87.0%)	196 (13.0%)	
50-64	6,988 (89.9%)	788 (10.1%)	
≥ 65	13,180 (92.7%)	1,042 (7.3%)	
Multivariate Analyses	Odds Ratio		P-value
Grade			0.002
Low Grade	1.0 (Ref)		
High Grade	2.25		
Lymphovascular Invasion			<0.001
Absent	1.0 (Ref)		
Present	4.94		
Tumor Location			0.008
Right	1.0 (Ref)		
Transverse	0.82		0.61
Left	1.73		0.005
Age (years)			<0.001
<50	1.0 (Ref)		
50-64	0.75		0.28
≥ 65	0.37		<0.001

Univariate and multivariate predictors of lymph node status (only significant factors shown)

REDUCING PATIENT BURDEN AND IMPROVING DATA QUALITY WITH THE NEW CLEVELAND CLINIC COLORECTAL CANCER QUALITY OF LIFE QUESTIONNAIRE (CCF – CAQL).

S2

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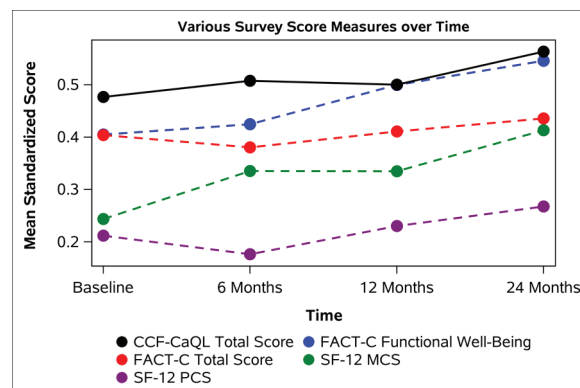
Purpose/Background: The Cleveland Clinic Colorectal Cancer Quality of Life of Questionnaire (CCF –CaQL) was developed by a panel of experts in response to the need for a new, fast and comprehensive tool for evaluating quality of life in patients with colorectal cancer. Although multiple surveys are available, none specifically address bowel issues, neo-adjuvant therapy and complications and their effect on quality of life. Questionnaires such as the SF-12 and FACT-C are too general to capture the nuances of colorectal cancer patients undergoing surgery. The more elaborate EORTC is lengthy, often resulting in incomplete or inaccurate data. With the current standard of care, patients must complete many surveys to get a well-rounded assessment of their quality of life. The aim of this study was to validate a new quality of life tool, the Cleveland Clinic Foundation Colorectal Quality of Life Questionnaire (CCF-CaQL) so it can be used in place of

the current multi-survey approach. We hypothesize that this new tool will allow clinicians to obtain more accurate data on quality of life while simultaneously reducing the time burden for patients.

Methods/Interventions: The CCF-CaQL contains 25 questions and covers the domains of quality of life, bowel function, and pain. It was collected as part of a worldwide IRB-approved multicenter randomized controlled study for low rectal cancer. Patients received this survey and others preoperatively and at 6, 12, and 24 months postop. Validation of the CCF-CaQL was performed using the FACT-C and SF-12 as comparison standards when needed. Selection bias was assessed in a univariate analysis of patient characteristics. Acceptability of individual questions was set to a 90% response rate. Construct validity and criterion validity was established with Spearman correlation coefficients, and internal consistency was measured with Cronbach's alpha. Discriminative validity was assessed, and the temporal changes in the CCF-CaQL total score were compared to those of the other scores.

Results/Outcome(s): Of 190 enrolled and evaluated patients, 142 answered at least one question on the CCF-CaQL, and 82 completed the entire survey preoperatively. A similar number of patients responded to the SF-12 (N=143) and FACT-C (N=142, $p=0.99$), yet the longer surveys had lower completion rates – only 9 completed every question for the FACT-C while 133 did for the SF-12 – highlighting the importance of concise surveying. The CCF-CaQL saw similar non-response profiles as the others with younger patients, patients receiving preoperative chemotherapy or radiotherapy, and patients from the US and France being less likely to respond to all three surveys. All except one CCF-CQOL question were deemed acceptable having <10% of responses missing. Each included question showed positive correlation with the FACT-C total score, thus supporting construct validity. Internal consistency was very high (standardized Cronbach's alpha = 0.92), and criterion validity was confirmed by the significant positive correlations of the CCF-CaQL total score with all FACT-C and SF-12 total and domain-specific scores (Spearman's rho: 0.34-0.79, p -values <0.001). The CCF-CaQL was able to detect a marginally significant difference in chemotherapy preoperatively ($p=0.06$), that FACT-C total, FACT-C functional SF-MCS and SF-PCS could not detect (p -values: 0.40, 0.67, 0.81, and 0.16, respectively). It was also similar to the SF-PCS across radiotherapy ($p=0.16$ vs $p=0.17$ SF-PCS), and more sensitive than the others ($p=0.40$ FACT-C total, $p=0.84$ FACT-C functional, $p=0.84$ SF-MCS). At 24 months, the CCF-CaQL was able to detect a significant difference between those who did and did not have postoperative complications ($p<0.001$), showcasing its discriminative validity. The CCF-CaQL score, like the other survey measures, appeared to increase over time from baseline to 24 months as expected (See Figure).

Conclusions/Discussion: The newly-developed CCF-CaQL combines elements of various well-known surveys into one efficient instrument to produce a reliable measure of QOL that better incorporates factors specific to colorectal cancer surgery.



Evaluation of fluctuations in various survey scores across time. To eliminate bias from differing point scales, each score was standardized to a (-1, 1) scale based on the minimum and maximum possible point values for that measure. The mean of each standardized score was then plotted at each time point to investigate temporal trends.

AGE-SPECIFIC COLORECTAL CANCER INCIDENCE TRENDS IN ENGLAND, 1974-2015: A POPULATION-BASED STUDY SHOWING INCREASED INCIDENCE AMONG YOUNG ADULTS.

S3

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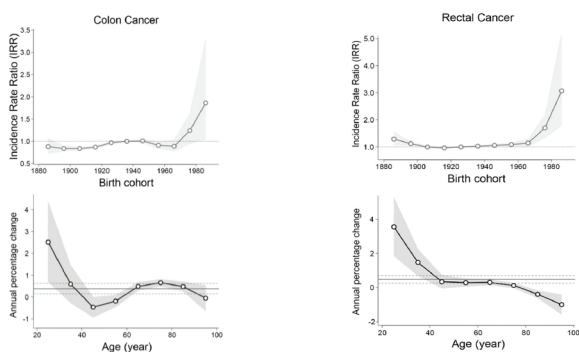
Purpose/Background: The incidence of colorectal cancer (CRC) in England has remained stable, although recent reports from North America suggest that CRC incidence is increasing among young adults. Given that age-specific and cohort trends have never previously been described in the English population, we aimed to determine whether there were age-related differences in CRC incidence trends and whether the magnitude of these temporal incidence trends was influenced by tumour site, i.e. colon or rectum.

Methods/Interventions: This was a retrospective, population-based cohort study of all patients aged 20 years and above diagnosed with CRC between 1974 and 2015 in England. Data were obtained from the National Cancer Registration and Analysis Service operated by Public Health England using ICD 9 and 10 codes for CRC. Mid-year population estimates were obtained from the Office for National Statistics and used to calculate age-specific incidence rates for ten age groups that were age-adjusted to the 2013 European Standard Population. Join-point regression analysis was performed to analyse the magnitude and direction of temporal changes in

age-specific incidence rates. Age-period-cohort modelling was used to assess the independent effects of age, period and cohort on CRC incidence rates.

Results/Outcome(s): There were 726,887 diagnoses of colon cancer and 418,752 diagnoses of rectal cancer in England between 1974 and 2015. The incidence rate of colorectal cancer has increased by 20.7% per year among 20-29 year olds since 2001 and by 12.7% per year among 30-39 year olds since 2009. Conversely, incidence rates among the early middle-aged (40-49 years and 50-59 years) and the elderly (>80 years) have remained relatively constant. There was an initial increase in CRC incidence following the introduction of screening in the 60-69 year age group in 2006, which has since plateaued. The age-specific relative risk of CRC by birth cohort remained constant between 1886 and 1966. Subsequently, the incidence rate ratio (IRR) for adults born in 1986, compared to the reference year of 1926, has doubled for colon cancer [IRR=1.92 (95% CI 1.08-3.43)] and has tripled for rectal cancer [IRR=3.07 (95% CI 1.79-5.26)] (Figure 1).

Conclusions/Discussion: This is the largest population-based cohort study to date to address age-related trends in CRC incidence. There have been substantial increases in the incident rate of CRC in adults aged under 40 years in England since the new millennium. Birth cohorts from the mid-1960s onwards have shown an exponential increase in the incidence of both colon and rectal cancer. Similar trends have also been reported in North America and suggest an epidemiological shift in the underlying risk factors, of which obesity and dietary habits warrant further investigation. If incidence rates continue to rise in the same exponential fashion for post-1960s birth cohorts as they get older, then this is likely to place a substantial burden on CRC services.



Age-period-cohort modelling (NCI Age Period Cohort web tool, <https://analysistools.nci.nih.gov/apc>) was used to assess the independent effects of age, period and cohort on colon and rectal cancer incidence rates. 11 birth cohorts were analysed starting in 1886 through to 1986 in ten-year bands. Data is shown as incidence rate ratios (IRR) with 95% confidence intervals (CI) to analyse cohort effects and age-specific net annual percentage change in incidence rates to examine local drift.

SHORT-COURSE RADIOTHERAPY WITH PERIOPERATIVE SYSTEMIC CHEMOTHERAPY FOR PATIENTS WITH RECTAL CANCER AND SYNCHRONOUS RESECTABLE LIVER METASTASES: A SINGLE CENTER CANADIAN EXPERIENCE.

S4

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Purpose/Background: Up to 20% of rectal cancer patients will present with synchronous liver metastases. For those with resectable disease, survival rates approach 40-50% at 5-years. Although a liver-first strategy is widely used, the timing and management sequence of the liver metastases in combination with the treatment of the rectal primary remains controversial. While long-course chemoradiation is commonly administered in this setting, this strategy may result in a prolonged duration without full systemic treatment. Short-course radiotherapy with a delayed interval to surgery may be effective in this setting as it is a convenient way of delivering radiotherapy to the rectal primary and avoiding interruption in systemic treatment. The objective of this study was to evaluate the clinicopathologic data and survival outcomes of rectal cancer patients with synchronous liver metastases treated with chemotherapy, hepatectomy and pre-operative short-course radiotherapy for the rectal primary tumor.

Methods/Interventions: The records of patients with rectal adenocarcinoma and synchronous liver metastatic disease who received curative-intent treatment with short-course radiotherapy (25 Gy in 5 fractions) from 2007 to 2018 were reviewed. Patients were excluded if they had unresectable disease, presence of a second primary tumor, treatment with long-course chemoradiation, or radiotherapy for palliative intent (due to unresectable disease, advanced age, or medical comorbidities). Patients who presented with both liver and lung metastases were included in the study as long as all metastases were treated with curative intent. Clinicopathologic features were collected and analyzed. Overall survival (OS) and recurrence-free survival (RFS) estimates were generated using the Kaplan-Meier method.

Results/Outcome(s): A total of 25 patients met inclusion criteria and were included in the study. The mean age was 56 (standard deviation 12) and 60% were male. All rectal primaries were considered locally advanced: 67% cT3 tumors, 33% cT4 tumors, 87% cN+, and 55% had a threatened circumferential resection margin (CRM) before treatment. 17% of patients had a low- (<5 cm from anal verge), 50% had a mid- (5-10 cm from anal verge), and 25% had an upper-rectal (10-15cm from anal verge) tumor. With regards to the liver metastases, 71% had ≥ 1 liver metastasis, 10% of which were bilobar. A liver-first strategy was performed in 64% of patients. This involved

4-6 cycles of preoperative chemotherapy followed by resection of the liver metastases. Their rectal primary were treated with short-course radiotherapy, followed by delayed total mesorectal excision (TME) surgery. In this particular group of patients, the timing of the radiotherapy in relation to hepatectomy varied. 4 patients were given short-course radiotherapy prior to hepatectomy with a mean interval of 82 days (SD 94), 10 patients were given radiotherapy post-hepatectomy with a mean interval of 89 days (SD 54). The mean interval from the end of radiotherapy to TME surgery for the entire study population was 121 days (SD 129). 16% of patients failed curative-intent treatment due to disease progression, half of which were initially assigned to a liver-first approach. The ypT stage distribution was 11% for pT1, 16% for pT2, 58% for pT3, and 46% for pT4 tumors. The ypN+ was 44%. 16% had a positive CRM post-treatment. 94% had a complete or near complete TME specimen. 19% of patients developed local recurrence and 52% developed distance recurrence. The median follow-up time was 20 months. The estimated median RFS for local recurrence was 2 months and for distance recurrence was 4 months. The estimated median OS of the study population was 52 months. The 1-, 3- and 5-year OS values were 90%, 68%, and 43%, respectively.

Conclusions/Discussion: In summary, this is one of the first North American experiences with the use of short-course radiotherapy in the setting of rectal cancer with synchronous liver metastases. Acceptable long-term survival and adequate locoregional control were achieved with this convenient regimen.

OUTCOMES FOR PATIENTS WITH RECTAL NEUROENDOCRINE TUMORS – AN NCDB ANALYSIS.

S5

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Purpose/Background: Though rectal neuroendocrine tumors are rare tumors overall, the rectum is the most common location for such tumors to arise in the gastrointestinal tract. Because of its rarity, the majority of evidence in the treatment of these tumors is based on single-institution experiences. Treatment options include observation, local excision, and radical resection. However, there is currently no consensus on the optimal management for patients with differing tumor sizes and those with involved lymph nodes.

Methods/Interventions: We analyzed the National Cancer Database (NCDB) from 2004 to 2015 for all patients with histology-proven rectal neuroendocrine tumor. We categorized treatments into no operation, local excision, and radical resection (e.g. low-anterior resection, total proctectomy). We performed Kaplan-Meier survival analysis and Cox proportional hazards analysis

to compare patient-related, disease-related, and surgery-related outcomes.

Results/Outcome(s): A total of 14,891 patients with rectal neuroendocrine tumor were identified. In total, 13,119 (88.1%) patients underwent a surgical procedure. Patients with larger tumors had worse 5-year survival ($p < 0.001$, 0.943 for ≤ 10 mm, 0.866 for 11-20mm, 0.818 for > 20 mm) and were more likely to undergo radical resection (5.7% of patients with ≤ 10 mm tumors, 15.3% in 11-20mm tumors, 16.1% in > 20 mm tumors). For patients with tumors ≤ 10 mm in size, 195/8137 (2.4%) had any lymph nodes (LNs) examined and 33/195 (16.9%) had positive lymph nodes. For patients with tumors 11-20mm in size, 92/885 (10.4%) had any lymph nodes examined and 58/92 (63.0%) had positive lymph nodes. Lastly, for patients with tumors > 20 mm in size, 139/973 (14.3%) had any lymph nodes examined and 95/139 (68.3%) had positive lymph nodes. Patients with positive lymph nodes had significantly worse 5-year survival compared to patients with no positive LNs ($p < 0.001$, 0.702 versus 0.902). After controlling for tumor size, treatment facility type, tumor grade, Charlson-Deyo comorbidity score, and presence of positive lymph nodes, there was no significant difference in overall survival between local resection and radical resection (Table 1). Alternatively, local resection was significantly associated with improved overall survival compared to no operation.

Conclusions/Discussion: The management of rectal neuroendocrine tumors remains controversial. To our knowledge, this is the largest series of patients with rectal neuroendocrine tumors. While some have advocated for non-surgical management for these tumors, we found in this study that any type of surgical management is associated with improved overall survival, with no significant difference in survival between local excision and radical resection. Patients with larger tumors were more likely to have radical resections, likely resulting in more lymph nodes examined and more positive lymph nodes. Interestingly, while only 2.4% of patients with tumors ≤ 10 mm in size had any LNs examined, a significant proportion (16.9%) had positive LNs. Patients with positive lymph nodes have significantly worse 5-year overall survival. However, after controlling for the presence of positive lymph nodes in multivariate Cox regression analysis, radical resection does not significantly improve overall survival compared to local excision. Therefore, for patients with a high preoperative suspicion for positive lymph nodes, there may be limited utility in performing a radical resection as compared to local excision.

Predictors	Univariable			Multivariable		
	P-value	Hazard Ratio	95% CI	P-value	Hazard Ratio	95% CI
Neuroendocrine Tumor Size						
≤10mm	Ref.	-	-	Ref.	-	-
11-20mm	<0.001	2.482	2.043 – 3.015	<0.001	1.937	1.580 – 2.374
>20mm	<0.001	3.177	2.664 – 3.788	<0.001	2.149	1.775 – 2.602
Positive Lymph Nodes	<0.001	3.833	2.986 – 4.919	<0.001	2.908	2.063 – 4.098
Age	<0.001	1.078	1.073 – 1.083	<0.001	1.068	1.061 – 1.075
Female Gender	<0.001	0.731	0.655 – 0.815	<0.001	0.728	0.631 – 0.840
Charlson/Deyo Comorbidity Score						
0	Ref.	-	-	Ref.	-	-
1	<0.001	2.333	2.025 – 2.688	<0.001	1.831	1.528 – 2.193
2	<0.001	4.682	3.738 – 5.863	<0.001	3.538	2.631 – 4.756
≥3	<0.001	8.349	6.166 – 11.306	<0.001	8.549	5.884 – 12.419
Grade						
Well-differentiated	Ref.	-	-	Ref.	-	-
Moderately-differentiated	0.002	1.668	1.208 – 2.302	0.162	-	-
Poorly-differentiated	<0.001	8.878	5.717 – 13.785	<0.001	6.263	3.782 – 10.370
Grade Unknown	0.042	1.170	1.006 – 1.362	0.807	-	-
Surgery Performed						
Local Excision	Ref.	-	-	Ref.	-	-
Radical Resection	<0.001	1.815	1.503 – 2.191	0.802	0.965	0.729 – 1.276
No Surgery	<0.001	2.919	2.563 – 3.324	<0.001	2.756	2.278 – 3.335

Table 1. Univariable and multivariable Cox proportional hazard analysis. CI = confidence interval.

LOW ANTERIOR RESECTION SYNDROME: INTERNATIONAL CONSENSUS DEFINITION.

S6

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Purpose/Background: Low Anterior Resection Syndrome (LARS) is pragmatically defined as disordered bowel function after rectal resection, leading to a detriment in quality of life. This broad characterisation does not allow for precise estimates of prevalence. The LARS score is a validated tool with good clinical utility but it lacks sensitivity to improvements over time and for evaluation of treatment strategies. The aim of this study was to produce a consensus definition of LARS that is widely accepted internationally.

Methods/Interventions: This international patient provider initiative employed three techniques to reach consensus; an online Delphi survey, regional patient consultation meetings, and an international consensus meeting. Three expert groups participated; patients, surgeons, and other health professionals from five regions (Australasia, Denmark, Spain, United Kingdom, and North America).

Results/Outcome(s): A total of 325 participants registered and the response rates for each successive round of the Delphi survey were 86%, 96%, 99%. Eighteen priorities for the definition emerged from the Delphi survey. After discussion at the consultation and consensus meetings this was distilled to eight symptoms and five consequences which encompass the important aspects of the syndrome.

Conclusions/Discussion: This is the first attempt to define LARS using robust methodology that included multiple stakeholders. It is also the first phase in a wider exercise to enable identification of rectal cancer survivors who suffer from bowel dysfunction, assess severity, and enable evaluation of treatment approaches to LARS. The

clinically relevant definition and sophisticated measurement tool will provide the basis for attempts to improve the bowel dysfunction that almost half of all rectal cancer patients endure after sphincter-preserving rectal resection. **Note: this work is the result of an international initiative and therefore will be submitted for presentation at all Tripartite Organisations 2019 Meetings (ASCRS, ESCP, ACPGBI, RACS) and will be submitted for consideration of publication in Annals of Surgery. The authors are aware that this is in conflict with the regulations of ASCRS abstract submission but request a dispensation as the participants of this project have affiliations to all Tripartite societies and the aim of this work was to reach a broadly accepted definition of LARS that can be used worldwide. If a dispensation is not possible the authors withdraw this submission.**

SURGICAL OUTCOMES FOLLOWING SALVAGE ABDOMINOPERINEAL RESECTION FOR ANAL SQUAMOUS CELL CARCINOMA: A POPULATION-BASED STUDY.

S7

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Purpose/Background: Up to 30% of patients with squamous cell cancer of the anus (SCCA) will require salvage abdominoperineal resection (APR) for either persistent or recurrent disease. Previous studies assessing long-term outcomes have been limited to single center studies with patients accrued over a long time period. The objective of this study was to identify the rates of salvage APR and overall survival with salvage APR in a single payer, universal health care system.

Methods/Interventions: The study population was all cases of SCCA who underwent chemoradiation therapy (CRT) with curative intent in Ontario, Canada between 2007-2015. Cases were identified using diagnostic codes in the population-based Ontario Cancer Registry (OCR) and treatment information from administrative data. The risk of salvage APR for persistent disease and recurrent disease were calculated. Predictors of salvage APR and overall survival were determined using both univariate and multivariate Cox models adjusted for potential confounding from sex, age, stage, completion of CRT. Patients not requiring salvage APR were the reference group.

Results/Outcome(s): A total of 1161 patients were diagnosed with SCCA and treated by CRT with curative intent during the study period. The 3-year colostomy free survival was 87.3% (95% CI 85.4-89.3). A total of 94 (8.1%) patients underwent salvage APR with 24 (25.5%) of these patients for persistent disease and 70 (74.5%) patients for recurrent disease. The 5-year overall survival was 71.7% (95% CI 68.8-74.6) among patients who did

not require salvage APR compared with 39.1% (95% CI 26.8-51.3) for patients with persistent disease and 64.2% (95% CI 45.1-83.4) for patients with recurrent disease ($P < 0.0001$). In adjusted models, patients who underwent salvage APR for any indication had worse survival (HR 2.25, 95% CI 1.69 – 3.01) than those who did not have salvage APR. The risk of death was also elevated in patients undergoing salvage APR for persistent disease (HR 2.62, 95% CI 1.89 – 3.63) and those undergoing salvage APR for recurrent disease (HR 1.57, 95% CI 0.90 – 2.74) compared to the reference group.

Conclusions/Discussion: This is the largest contemporary study of outcomes following salvage APR for persistent and recurrent SCCA. We found that the risk of APR was lower than those found in older studies. Those requiring salvage APR had higher 5-year mortality.

DOES RE-RESECTION OF MICROSCOPICALLY POSITIVE MARGINS FOUND USING INTRA-OPERATIVE FROZEN SECTION PATHOLOGICAL ANALYSIS RESULT IN A SURVIVAL BENEFIT IN PATIENTS UNDERGOING SURGERY FOR LOCALLY RECURRENT RECTAL CANCER?

S8

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Purpose/Background: Intra-operative frozen section (IOFS) analysis can be utilized during surgery for recurrent rectal cancer (RRC) to assess margin status. In the presence of microscopically positive (R1) margins, our practice is to re-resect with the aim of achieving a negative margin (R0). Intraoperative radiotherapy (IORT) is administered in the majority of cases but its use and dose are dependent on margin status. We aimed to assess if utilizing IOFS analysis impacts 5-year overall recurrence and survival.

Methods/Interventions: Retrospective analysis of a prospectively maintained RRC database was performed. All patients between 2000 and 2015 with R1 margins on IOFS were included and grouped according to their final resection outcome and IORT status; *Group (Gp.) 1* (R1 to R0 with IORT), *Gp. 2* (R1 to R1 with IORT), *Gp. 3* (R1 to R0 without IORT) and *Gp. 4* (R1 to R1 without IORT). Patients with R2 resections were excluded. Five-year

overall survival and recurrence rates were compared between groups with and without IORT; *Gp.1* vs. *2* and *Gp.3* vs *4*. Demographics are presented as median data and compared using Pearson's chi squared. Survival and recurrence results are presented as mean % (SE) and compared using the log-rank statistic.

Results/Outcome(s): 211 patients with an initial R1 resection were analyzed. The age at first recurrence across all groups (≤ 55 yrs in 53.8% and >55 yrs in 46.9%, $p=0.92$) and the time to first recurrence (≤ 2 yrs in 43.1% and >2 yrs in 56.9%, $p=0.83$) were comparable. The 5-year overall survival and local recurrence rate are detailed in the table provided below. For comparison, our 5-year survival and recurrence rates for an R0 resection with IORT were 42.3% (5.6) and 65.3% (5.4) respectively.

Conclusions/Discussion: No clear benefit in 5-year survival or disease recurrence was seen between patients with a final IOFS status of R1 and those that were re-resected to R0 when IORT was given. When IORT was not administered, re-resection from R1 to R0 trended toward improved survival and less total recurrence, but this was not statistically significant. Re-resection in an attempt to achieve R0 status in R1 patients subsequently undergoing IORT may increase the risk of surgical morbidity without oncological benefit. IORT may provide significant disease control negating the need for re-resection when margins are microscopic positive in patients with RRC.

COMPUTERIZED IMAGING FEATURES OF PRIMARY RECTAL CANCER ON BASELINE T2-WEIGHTED MRI MAY ENABLE ACCURATE PREDICTION OF PATIENTS WHO WILL ACHIEVE PATHOLOGIC COMPLETE RESPONSE OR NON-RESPONSE TO NEOADJUVANT CHEMORADIATION.

S9

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Purpose/Background: In the current treatment protocol for patients diagnosed with locally advanced rectal cancer, a critical challenge is identifying how well a patient will respond to neoadjuvant chemoradiation (nCRT) prior to undergoing total mesorectal excision. Up to 54% of rectal cancer patients have been found to fail treatment

S8 5-year outcomes following recurrent rectal cancer resection grouped according to final resection margin and IORT status

	Gp 1 (n=95)	Gp 2 (n=78)		Gp 3 (n=27)	Gp 4 (n=11)	
5-year FU (% SE)	R1-R0+IORT	R1-R1+IORT	P value	R1-R0 no IORT	R1-R1 no IORT	P value
Survival/ last known follow-up	28.5% (5.4)	26.0% (5.2)	p=0.61	37.2% (1.4)	11.8% (1.1)	p=0.08
Recurrence (local+distant)	85.3% (4.4)	88.9% (3.7)	p=0.61	77.2% (1.3)	87.9% (1.1)	p=0.49

(minimal or no tumor regression after nCRT), yet may not receive curative surgery until 4 months after diagnosis. Another 25% of patients will achieve pathologic complete response (no residual tumor) after nCRT, but will still be subjected to a morbid excision surgery. Potential non-responders to nCRT could instead be sent straight to surgery or undergo alternative therapeutic pathways; while likely complete responders could have more aggressive nCRT and intensive follow-up to ensure disease-free outcomes. T2-weighted (T2w) MRI is typically acquired prior to nCRT for clinical tumor staging and treatment planning, but there are no predictive imaging markers for response to nCRT. Alternately, computer-extracted image texture measurements from MRI (known as radiomic features, quantifying heterogeneity, homogeneity, gradients, and other image-based patterns) may better capture subtle tumor characteristics linked to pathologic treatment response *in vivo*; features that may not be visually appreciable on MRI. Our goal was to evaluate the use of radiomic features of the primary tumor on diagnostic T2w MRIs in conjunction with machine learning, to predict pathologic complete response (pCR) and non-response (NR) to nCRT in rectal cancer patients.

Methods/Interventions: This retrospective study involved 3 independent centers, yielding a total of 100 patients for model training from Site 1, with 32 and 7 patients for external validation from Sites 2 and 3, respectively. Patients diagnosed and treated for rectal cancer between 2011 and 2018 were considered based on the following inclusion criteria: (1) pre-treatment diagnostic T2w MRI, (2) nCRT followed by TME, and (3) availability of pathology reports. Pathologic nCRT response was defined using AJCC grading system (8th ed). Expert radiologist annotations of the suspicious tumor lesion were made on 3 consecutive slices in an acquisition plane axial through tumor on T2w MRI. 191 computer-extracted radiomic features were extracted from the annotated region to quantify tumor appearance on imaging. The most discriminatory radiomic features identified via statistical testing were used to construct 2 separate random forest models to predict: (a) likelihood of a patients achieving pCR (AJCC = 0) and (b) likelihood of a patient exhibiting NR (AJCC = 3). Machine learning model construction was performed only on the training set with 50 runs of 3-fold cross-validation to ensure robustness, and optimal thresholds for model likelihoods to assign a patient to pCR or NR were defined to minimize false positives. Model performance was evaluated based on sensitivity and specificity within the training and as well as on 2 external validation sets.

Results/Outcome(s): The training set comprised 19 patients who achieved pCR, 18 who showed NR, and the remaining 63 having intermediate response to nCRT. The 2 validation sets combined comprised 11 pCR patients, 3 NR patients, and 25 intermediate responders to nCRT. The pCR predictor correctly classified 13/19 patients

(68.4% sensitivity and 74.1% specificity) in the training set and 8/11 patients (72.7% sensitivity and 82.1% specificity) in the validation sets. The NR predictor correctly identified 12/18 patients (66.7% sensitivity and 76.8% specificity) in the training set and 1/3 patients (33.3% sensitivity and 80.6% specificity) in the validation set. Top-ranked radiomic features in each of the pCR and NR models comprised similar measurements which quantified entropy in local signal intensities or randomness in organization of pixel-wise gradients within the tumor region.

Conclusions/Discussion: Computerized imaging (radiomic) descriptors of the primary tumor on MRIs may enable accurate prediction of pathologic response or non-response to neoadjuvant chemoradiation in rectal cancers. The most relevant radiomic features quantified textural patterns of intensity or gradient heterogeneity between tumors which achieved pCR or NR to nCRT from those with intermediate response. These radiomic features and the associated machine learning predictors maintained strong predictive performance across 3 different sites, in both tasks. To our knowledge, this is one of the first studies to perform multi-site evaluation of radiomic features in predicting pathologic response of rectal cancers to chemoradiation via baseline MRIs. Further validation of these predictive radiomic models against histopathology to better understand their underlying pathologic and physiologic basis, is currently underway.

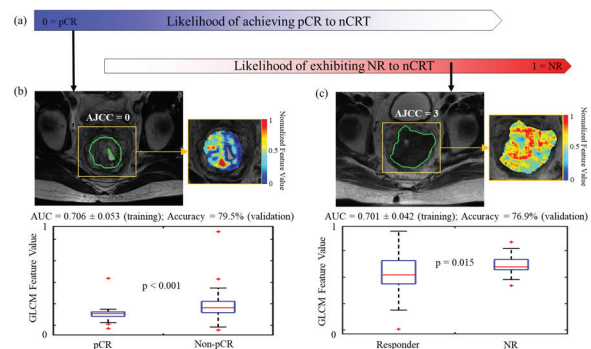


Figure 1: (a) Machine learning prediction models based on computerized imaging features output likelihoods of patients achieving pCR after nCRT (values close to 0) or likelihood of exhibiting NR to nCRT (values close to 1). (b) A correctly classified pCR patient with the corresponding heatmap of the top-ranked radiomic feature for pCR prediction, demonstrating significantly differences in pixel-wise entropy between pCR and non-pCR patients. (c) A correctly classified NR patient with a heatmap of a top-ranked radiomic feature, with significantly higher pixel-wise gradient entropy in NR patients. Above each set of boxplots are the training area-under-ROC curve (AUC) and accuracy reported for training and validation sets, respectively, for each prediction model.

NATIONAL CANCER DATABASE ANALYSIS OF OVERALL SURVIVAL FOR RECTAL CANCER, BENEFIT OR BIAS?

S10

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Purpose/Background: The National Cancer Database (NCDB) is a national database that is frequently used in cancer research. It has a wealth of pathologic and tumor related information, but its patient specific factors and long-term outcome data are limited. Patient comorbidity information is limited to a Charlson-Deyo score. The only long-term outcome provided is overall survival. Despite this, many studies use the NCDB to assess the efficacy of treatments. For example, several recent publications assessed the efficacy of adjuvant chemotherapy (aCXT) following neoadjuvant therapy (nCXRT) and proctectomy in rectal cancer. Significant benefit was ascribed to aCTX. We hypothesize that overall survival benefits seen in retrospective analysis of the NCDB may represent bias as opposed to true benefit. These survival benefits more than likely reflect the fitness of the patients selected for therapy, not necessarily the effects of the treatment itself.

Methods/Interventions: We conducted a retrospective review of the NCDB between 2006 and 2014. We recreated a patient cohort based on two recently published articles examining the relationship between overall survival and aCTX after nCXRT and surgery for rectal cancer. We identified patients with clinical stage II/III rectal adenocarcinoma who received neoadjuvant chemoradiotherapy therapy followed by proctectomy. We first performed multivariate cox proportional hazard modeling for the overall cohort and stratified by pathologic stage to examine the relationship between the receipt of aCXT and overall survival. This replicated what was previously done in the published studies. We then performed the same analyses stratified by patient age to examine the change in hazard ratio by age group.

Results/Outcome(s): 34,312 patients were identified. In age adjusted models, aCXT was associated with a significant overall survival benefit in the whole cohort (HR 0.69, $p<0.001$) and in each pathologic stage group. The benefits associated with aCXT decreased as pathologic stage increased. For example, in the pathologic complete response (pCR) cohort, aCXT was associated with a 50% survival benefit, compared to a 25% benefit in patients with pathologic stage III disease. Our cohort results were consistent with those reported in the published studies (table 1). After stratification by age, the survival benefit associated with aCXT was attenuated in young patients and pronounced in older patients. In the overall cohort, the HR associated with aCXT in patients younger than 50 was not significant (HR 0.86, $p=0.06$), while it was noted to be highly significant in the >70 population (HR 0.63, $p<0.001$). Similar trends were seen in each pathologic stage strata. In patients with a pCR, aCXT was not associated with significant benefit in the youngest cohort of patients (HR 0.75, $p=0.40$), but was highly associated with survival in the oldest cohort (HR 0.39, $p=0.001$). The same trend in hazard ratio was noted for each pathologic stage. In all stages, aCXT appeared more beneficial for older patients.

Conclusions/Discussion: We demonstrate using a retrospective review of the NCDB that efficacy of aCXT varies markedly depending on the age of the patient cohort when overall survival is the outcome. Two particular findings are of note. First, patients over 70 appear to have the greatest benefit from aCXT, overall and across stage strata. Second, patients with pCR appear to benefit more greatly from aCXT than patients with node positive disease. In fact, the most significant benefit noted for aCXT was seen in patients who are over 70 and have a pCR. These findings together highlight the fact that the benefits attributed to aCXT likely reflect the fitness of the patients receiving it. Patients older than 70 who receive aCXT are likely different in ways unmeasurable in the NCDB from the patients who do not get aCXT. Those differences almost

S10 Table 1

	Adjusted HR	Stratified Analysis by Age			
		<50	50-59	60-69	70+
Overall	0.69 $p<0.001$	0.86 $p=0.06$	0.78 $p<0.001$	0.67 $p<0.001$	0.63 $p<0.001$
pCR	0.51 $p<0.001$	0.75 $p=0.4$	0.64 $p=0.13$	0.52 $p=0.007$	0.39 $p=0.001$
Pathologic Stage I	0.62 $p<0.001$	0.87 $p=0.54$	0.63 $p=0.007$	0.60 $p<0.001$	0.55 $p<0.001$
Pathologic Stage II	0.71 $p<0.001$	0.76 $p=0.07$	0.72 $p=0.03$	0.73 $p=0.005$	0.70 $p=0.001$
Pathologic Stage III	0.75 $p<0.001$	0.91 $p=0.35$	0.87 $p=0.05$	0.65 $p<0.001$	0.63 $p<0.001$

Adjusted Hazard Ratio (HR) for adjuvant chemotherapy for rectal cancer stratified by pathologic stage compared to the adjusted HR stratified by Stage and Patient Age.

certainly have a large impact on overall survival, which is the only available long-term outcome. In patients with pCR, the decision making for aCXT, especially in older patients, may be more influenced by patient fitness than in patients with pathologic node positive disease. Our findings suggest a large selection bias associated with evaluating, in a retrospective fashion, the association between overall survival and treatment, in this case aCXT. This bias is likely especially prevalent when the decision for treatment is not always obvious (such as in patients with pCR after nCXRT) and, due to risks of therapy, is impacted greatly by unmeasurable patient factors. Caution should be used when making conclusions regarding a treatment's efficacy in this retrospective, and likely, highly biased, fashion. Although more difficult, prospective, and, when possible, randomized, trials are the best method for truly understanding the benefits of particular cancer therapies.

COMPLIANCE WITH PREOPERATIVE ELEMENTS OF THE AMERICAN SOCIETY OF COLON AND RECTAL SURGEONS RECTAL CANCER SURGERY CHECKLIST IMPROVES PATHOLOGIC AND POSTOPERATIVE OUTCOMES.

S11

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Purpose/Background: In 2016, the American Society of Colon and Rectal Surgeons (ASCRS) published a rectal cancer surgery checklist comprising the essential elements of pre-, intra- and postoperative care for patients undergoing rectal cancer surgery. The purpose of this study was to assess whether compliance with preoperative checklist elements was associated with improved pathologic and 30-day postoperative outcomes after rectal cancer surgery.

Methods/Interventions: After institutional review board approval, patients undergoing elective rectal cancer surgery were identified from the 2016-2017 American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) proctectomy-targeted database. Of the 10 preoperative elements listed in the ASCRS checklist, 6 are routinely collected in the ACS-NSQIP database (Table 1): complete colonoscopy, logoregional staging, distant staging, tumor location in the rectum, appropriate preoperative stoma marking, and appropriate use of neoadjuvant radiotherapy. Patients with complete checklist compliance according to these 6 elements (CCC: 6/6 elements) were compared to patients with incomplete checklist compliance (ICC: 0-5/6 elements). The outcomes of interest included pathologic (circumferential resection margin status, distal resection margin status, lymph node harvest >12) and 30-day postoperative (overall morbidity, surgical morbidity, readmission, and length of stay) outcomes. Multivariate regression was used to adjust for patient, tumor, and treatment characteristics.

Results/Outcome(s): In total, 2,217 patients were included in the analysis. Individual compliance with the 6 checklist items was variable: 86.8% for complete colonoscopy, 76.6% for locoregional staging, 70.8% for distant staging, 91.3% for tumor location in the rectum, 84.0% for appropriate preoperative stoma marking, and 79.8% for appropriate use of neoadjuvant radiotherapy. Only 836 patients were compliant with all 6 items (CCC: 37.7%), while 1,381 were not (ICC: 62.3%). CCC patients were younger in age (60.0 vs. 63.0 years, $p < 0.001$), had a higher proportion of clinically locally-advanced tumors (80.8% vs. 61.0%, $p < 0.001$) and increased use of neoadjuvant radiotherapy (86.2% vs. 43.6%, $p < 0.001$), but were otherwise similar to ICC patients. On multivariate analysis, CCC was associated with lower odds of circumferential resection margin positivity (OR=0.47, 95% CI 0.31-0.71, $p < 0.001$), higher odds of adequate lymph node harvest >12 (OR=1.60, 95% CI 1.29-2.00, $p < 0.001$), reduced overall morbidity (OR=0.80, 95% CI 0.66-0.96, $p = 0.019$) and surgical morbidity (OR=0.79, 95% CI 0.65-0.96, $p = 0.016$), and shorter length of stay (b=-0.90, 95% CI -1.53--0.27, $p = 0.005$). CCC was not associated with less 30-day readmission (OR=0.85, 95% CI 0.66-1.09, $p = 0.21$) or distal resection margin positivity (OR=0.51, 95% CI 0.22-1.05, $p = 0.081$).

Conclusions/Discussion: Complete compliance with six preoperative elements of the ASCRS rectal cancer surgery checklist is associated with significantly improved pathologic outcomes and reduced postoperative morbidity. Further research should aim at validating the remaining elements of the checklist and correlating the checklist with long-term oncologic outcomes to further encourage its use and dissemination.

Table 1 – American Society of Colon and Rectal Surgeons rectal cancer surgery checklist preoperative elements and corresponding American College of Surgeons National Surgical Quality Improvement Program variables

ASCRS Rectal Cancer Surgery Checklist – Preoperative Elements	ACS-NSQIP Variables
Formal pathology review was performed to identify the presence of invasive carcinoma.	N/A
In the unobstructed patient, a complete colonic evaluation was performed.	Complete evaluation of colon preoperatively.
The tumor location within the rectum (e.g. distance from anal verge, tumor length, anterior/posterior/left/right) as well as relationship to the levators and anorectal ring was documented.	Tumor location in the rectum from the anal verge (categorized as high/mid/low based on preoperative evaluation notes, preoperative endoscopy, or operative report).
An assessment of family history, preoperative stool continence and sexual function was documented.	N/A
Clinical staging of the primary tumor (ERUS or MRI) was performed.	Pretreatment clinical staging – primary tumor and regional lymph nodes.
Clinical staging for distant metastases (Chest/Abdomen/Pelvis) was performed.	Pretreatment clinical staging – distant metastasis.
Preoperative or peri-operative CEA level was measured.	N/A
Consideration of neoadjuvant treatment for > T2 or node positive disease has been documented. Among those who received neoadjuvant treatment, the tumor was re-staged and location was re-confirmed just prior to operation.	Radiation therapy within 90 days prior to surgery for clinically locally-advanced (> T2 or node positive) tumors.
A multi-disciplinary discussion of care, preferably during a formal Tumor Board conference, was documented.	N/A
If a stoma is considered, the site was preoperatively marked.	Patient marked for stoma preoperatively (considered in all mid-low and/or irradiated tumors).

N/A = Not Available; ASCRS = American Society of Colon and Rectal Surgeons; ACS-NSQIP = American College of Surgeons National Surgical Quality Improvement Program; ERUS = Endorectal Ultrasound; MRI = Magnetic Resonance Imaging; CEA = Carcinoembryonic Antigen

COMPLETE RESPONSE ON POST-TREATMENT RECTAL CANCER MRI DEMONSTRATES POOR AGREEMENT TO PATHOLOGIC ASSESSMENT.

S12

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Purpose/Background: Rectal cancer MRI plays a critical role in the pretreatment staging of rectal cancer. Post-neoadjuvant treatment MRI is often obtained to inform the degree of downstaging, guide operative management and in some cases can demonstrate radiologic complete response for consideration of a “watch and wait” strategy. The aim of this study is to evaluate the degree of correlation of radiographic staging using post-neoadjuvant MRI to actual pathology for patients who demonstrate downstaging to T0 or N0 disease

Methods/Interventions: This is a retrospective review of all patients undergoing rectal cancer surgery at a single institution from 2013-2018. All patients with available pre- and/or post-treatment MRI and pathologic data were included for analysis. Tumor and nodal stages were evaluated using Cohen’s Kappa statistic to determine the correlation between MRI and pathologic grading.

Results/Outcome(s): A total of 113 patients were included for analysis. In comparison of pre- and post-treatment MRI, the rate of downstaging for T2, T3 and T4 lesions was 28.0%, 37.1% and 31.2%, respectively. The rate of downstaging for N1 and N2 disease was 41.0% and 61.4%, respectively. The sensitivity of T0 disease on post-treatment MRI was 89.3% (95CI 81.6-94.5) with a specificity of 22.2% (95CI 2.8-60%). The negative predictive value of a T0 lesion was 15.3% (95CI 4.5-41.1). The sensitivity of N0 disease on post-treatment MRI was 67.3% (95CI 52.5-80.1) with a specificity of 55.4% (95CI 41.4-68.7). The negative predictive value of N0 disease is 65.9% (95CI 54.8-75.5). Agreement of post treatment MRI and pathology is “slight” for T staging (Kappa 0.16, 95CI 0.04-0.28) and N staging (Kappa 0.07, 95CI-0.02-0.71).

Conclusions/Discussion: Post-treatment MRI offers only “slight” agreement to pathologic staging of T and N disease for rectal cancer. Findings of radiologic complete response disease should be approached with caution. This is most critical in selection of patients for a “watch and wait” strategy as the negative predictive value for T0 and N0 disease is low.

OVERPRESCRIPTION OF OPIOIDS FOLLOWING OUTPATIENT ANORECTAL SURGERY: A SINGLE INSTITUTION STUDY.

LT1

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Purpose/Background: Excess opioid prescribing by surgeons contributes to the growing opioid epidemic by putting patients at risk of new opioid dependence and increasing the supply of opioid pills in the community available for misuse. Recent publications have demonstrated that surgeons overprescribe postoperative opioids for patients undergoing general surgery procedures. However, there is a paucity of data describing opioid prescribing and use among patients undergoing anorectal surgery. The objective of this study was to describe opioid prescribing practices for patients undergoing common outpatient anorectal procedures and to assess patient reported outcomes regarding opioid use and pain management.

Methods/Interventions: Chart review was conducted for patients that underwent an outpatient anorectal procedure at a single institution between April-June 2018. Opioids prescribed at discharge and the occurrence of refills was recorded. All postoperative opioids were normalized to 5mg oxycodone pills. Patient reported outcomes regarding opioid use and the adequacy of postoperative pain management were assessed using previously validated measures administered via survey at the first postoperative visit.

Results/Outcome(s): A total of 83 patients underwent anorectal surgery in the study period. The majority underwent fistulotomy, seton placement, or incision and drainage (I&D) (n=55), followed by exam under anesthesia (EUA) with or without biopsy (n=17) and hemorrhoidectomy (n=11). Opioid pain medication was prescribed at discharge for the vast majority of patients (87% fistula/I&D, 65% EUA, 100% hemorrhoidectomy). Patients undergoing EUA were prescribed the least number of opioid pills (median 7, range 0-23) followed by fistula/I&D (median 12, range 0-60) and hemorrhoidectomy (median 27, range 3-60). The overall response rate for the survey was 47%. Many patients reported not filling their opioid prescription (36% fistula/I&D, 20% hemorrhoidectomy, 43% EUA). Refill requests were similar for patients undergoing Fistula/I&D and hemorrhoidectomy (13% and 9% respectively) and lower for patients undergoing EUA (6%). Among patients who filled their prescription, 50% reported using fewer than five pills regardless of surgery type. As a result, hemorrhoidectomy patients had the largest number of excess, unused pills (median 22.5, range 5-35), followed by fistula/I&D (median 7, range 0-30) and EUA (median 5, range 0-23). Hemorrhoidectomy patients reported higher levels of average pain following discharge than other patients (table), however the majority of all patients report minimal interference with day to day activities due to pain.

Conclusions/Discussion: We identified considerable variation in opioid prescribing after outpatient anorectal surgery in this ongoing quality improvement study. The vast majority of patients either did not fill their prescription or used fewer than 5 pills, yet they still reported adequate pain control after discharge. We are currently using these results to develop better predictive strategies and standardized recommendations for postoperative prescribing to minimize excess, unused opioids while ensuring adequate pain management. These results also emphasize the need to supply patients with a mechanism for disposing of unused opioids. Future work will assess the impact of such interventions on patient reported outcomes and opioid use.

TERMINAL ILEUM INTUBATION DURING SCREENING COLONOSCOPY: DO I REALLY NEED TO GO THAT FAR?

LT2

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Purpose/Background: The use of routine intubation of the terminal ileum (TI) in asymptomatic patients undergoing screening colonoscopy is unclear. There currently exists conflicting data and a lack of standardized guidelines concerning TI intubation in this population, and therefore, our aim was to assess and analyze TI intubation in screening colonoscopies and determine the clinical and pathological yield.

Methods/Interventions: Screening colonoscopies performed at a tertiary level hospital system between July 2016 and September 2018 were queried from a prospectively maintained institutional colonoscopy database. Patients with history of inflammatory bowel disease, colorectal cancer or previous bowel resection were excluded. Examinations which had TI intubation were selected and analyzed. Main outcome measures included gross examination findings and pathological analysis of terminal ileal biopsies. Additionally, univariate analyses were conducted

to compare patient demographics, scope times and quality of bowel preparation between the TI intubation group versus those who did not have TI intubation.

Results/Outcome(s): A total of 25,493 screening colonoscopies were evaluated and 5,752 (22.5%) had TI intubation. In the TI intubation group, withdrawal times were significantly longer (10 vs. 9 minutes), bowel preparation quality was graded as better (98.5 vs. 94.8), and patients were younger (58.7 vs. 60 mean years old); all $p < 0.001$. A total of 100/5,752 colonoscopies had gross TI findings, in which biopsies were collected and underwent subsequent histopathological examination. Of these specimens, 40/100 patients had a biopsy proven pathological finding and the other 60 revealed normal TI mucosa. 38/40 patients had acute or chronic enteritis of unknown significance, in which none went on to a diagnosis of inflammatory bowel disease at short-term follow-up. One patient had an inflammatory polyp and one patient had a well-differentiated neuroendocrine tumor. The overall gross pathological findings were 0.17% and pathologic abnormalities were diagnosed in only 0.6% of patients.

Conclusions/Discussion: The findings of this study support the conclusion that routine TI intubation in asymptomatic patients undergoing screening colonoscopy is unwarranted.

NO NEED TO WATCH THE CLOCK: PERSISTENCE DURING LAPAROSCOPIC SIGMOIDECTOMY FOR DIVERTICULAR DISEASE.

LT3

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Purpose/Background: Laparoscopy sigmoidectomy is associated with reduction in length of hospital stay (LOS) and is the preferred approach for the surgical treatment of sigmoid diverticulitis. It is unclear if the benefits of laparoscopy persist when operative times are prolonged.

LT1 Patient reported pain scores and pain interference with daily activities by surgery type

		Fistula/I&D	Hemorrhoidectomy	EUA
Average pain since discharge	No pain	33%	20%	43%
	Mild	37%	20%	14%
	Moderate	22%	60%	29%
	Severe	7%	0%	14%
	Very Severe	0%	0%	0%
Pain interference with activities	Not at all	33%	20%	57%
	A little bit	37%	40%	14%
	Somewhat	15%	20%	14%
	Quite a bit	15%	20%	0%
	Very much	0%	0%	14%

The aims of this study were to compare morbidity and LOS according to operative times and conversion and determine if prolonged laparoscopic operative time is an independent risk factor for longer LOS. We hypothesized that longer laparoscopic operative times are associated with increased morbidity and longer LOS.

Methods/Interventions: A retrospective review of patients approached with laparoscopy for sigmoid diverticulitis included in a prospectively maintained database over a 5-year period at a single institution was performed. Patients undergoing straight and/or hand-assisted laparoscopic sigmoidectomy for diverticular disease were included, and those who had laparoscopic surgeries that were either completed or converted to open were included. Exclusion criteria were immediate conversion after diagnostic laparoscopy, robotic or single port procedures, combination with other operations, need for extended colectomy, and urgent procedures. Operative times among laparoscopic completed cases were divided into quartiles. Univariate and multivariate analyses were used to assess factors associated with longer operative time quartile.

Results/Outcome(s): A total of 466 patients were operated on by 23 surgeons over the time period, of which 36 (7.7%) were converted to open. The most common reason for conversion was difficult visualization due to adhesions and/or inflammation (N= 27, 75.0%) followed by anastomotic difficulties (N= 3, 8.3%) and injury to surrounding structures (N=3, 8.3%). The resulting operative quartiles (Q1 <155 min, Q2:155-187 min, Q3:188-230 min, Q4: >230 min) were associated with comparable postoperative morbidity (P >0.05). Postoperative LOS was longer for converted vs. laparoscopic completed cases (median 6.5 vs. 4 days, P<0.001). Patients in the longest laparoscopic completed operative quartile (Q4) were associated with longer LOS when compared with the remaining quartiles (median 5 vs. 4 days for Q4 vs. Q1,Q2,Q3, P<0.001). Patient characteristics associated with longer operative times included older age, higher body mass index (BMI), greater estimated blood loss (EBL), elective creation of diverting loop ileostomy, history of hypertension (HTN), and presence of adhesions, fistula, or abscess (all P-values <0.05). On multivariate analysis, increased operative time was a predictor of LOS, but only when higher quartiles (Q2, Q4) were compared to the lowest quartile (Q1) (>230 vs <155 minutes and 155-187 vs <155 minutes, effect estimate (EE) 1.3; P<0.001 for both). Other independent factors associated with longer LOS were increased EBL (EE 1.03; P=0.005), hypertension as comorbidity (EE 1.2; P<0.001), and elective diverting ileostomy creation (EE 1.7; P<0.001).

Conclusions/Discussion: Our data do not support preemptive conversion of laparoscopic sigmoidectomy procedures to open operations to avoid prolonged operative times. As long as progress is safely being made, surgeons are justified to continue pursuing laparoscopic completion.

ANALYSIS OF SYNCHRONOUSLY RESECTED PAIRED PRIMARY COLORECTAL CANCERS AND METASTASES REVEALS DISCORDANCE IN MISMATCH REPAIR PROTEIN EXPRESSION.

LT4

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Purpose/Background: Immunotherapy has proven a largely ineffective treatment for mismatch repair (MMR) proficient colorectal cancer (CRC). However patients with MMR deficiency have been shown to respond to T cell checkpoint inhibition. Strategies to improve responsiveness to immunotherapy are being sought across genetic subtypes of CRC. Using a cohort of synchronously resected CRC and metastases we examine the relationships between Consensus Molecular Subtypes (CMS) of paired primary and metastatic colorectal cancers to establish the concordance between sites. Particularly we assessed whether MMR status remained concordant.

Methods/Interventions: 33 patients that had synchronous resection of primary CRC and liver metastases at Glasgow Royal Infirmary were included. CMS subtyping was performed histologically using published immunohistochemistry stains: HTR2B, ZEB1, FRMD6, CDX2, CK stains were used to differentiate CMS2/3 epithelial disease from mesenchymal CMS4 disease. MLH1, MSH2 staining was used to establish MMR status. MLH1, MSH2 were scored positive or negative, while other stains were scored as previously described (Trinh et al, Clin Cancer Res. 2017 Jan 15;23(2):387-398). 2 independent researchers scored each case and confirmed concordance.

Results/Outcome(s): There was high concordance in CMS subclassification between primary and secondary sites (P<0.001). 2 of 33 patients (6%) had MMR deficiency within their primary tumors, while their liver metastases were also MMR deficient as expected. 3 (9%) patients that expressed MMR proteins in their primary tumors had discordance at the secondary site with loss of MMR proteins in their metastases. There were no differences seen in survival between patients that had MMR deficient metastases. 5 (15%) patients had CMS2 disease in their primary site that became phenotypically mesenchymal and CMS4 subtype at the metastatic site. There were no relationships between MMR status and number of metastases, however there was a trend towards larger metastases in MMR deficient cases (P=0.1). These findings suggest that in a proportion of colorectal cancers there is phenotypic evolution in the process of metastasis.

Conclusions/Discussion: At present chemotherapies are targeted based on biopsies of primary colorectal cancer tissue. Moving into an era of targeted therapies and immunotherapy, one of the major challenges will be to target drugs to the correct patients at the correct point in time. We observe here discordance in MMR status between the primary and metastatic sites. Those patients that

lose MMR expression upon formation of metastases may benefit from T cell directed checkpoint blockade. Further work is required to elucidate the clinical significance of this observation in a larger cohort. However, these data suggest that prior to commencement of therapy for metastatic colorectal cancer, metastases should be biopsied, and the disease phenotypically assessed.

CONDITIONAL SURVIVAL OF PATIENTS WITH COMPLETE CLINICAL RESPONSE MANAGED NON-OPERATIVELY – WHAT IS THE RISK OF RECURRENCE AFTER ACHIEVING 1-YEAR DISEASE-FREE? DATA FROM A SYSTEMATIC REVIEW WITH IMPLICATIONS FOR SURVEILLANCE STRATEGIES.

LT5

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Purpose/Background: Neoadjuvant CRT may lead to significant tumor regression in patients with rectal cancer. Non-operative strategies in selected patients with complete clinical response (cCR) have gained popularity over the last few years. However, the need of an intensive follow-up for an indeterminate period of time remains as one of the main drawbacks of this approach. In addition, even though recently published systematic reviews have reported 3-year oncological outcomes with this strategy, the risk of recurrence after having achieved 1-year without recurrence is largely unknown. In order to estimate the risk of recurrence of patients with rectal cancer after neoadjuvant CRT and cCR after 1-year without recurrence following non-operative management, we have estimated conditional survival from previously published studies using this approach.

Methods/Interventions: Studies reporting the outcomes of non-operative management of patients with rectal cancer following CRT and cCR were eligible for the present analysis and were reviewed. Only studies reporting 3-year oncological outcomes were included. CS is defined as the probability of surviving an additional number of years (y) given that a patient has already survived for “x” number of years. For example, the conditional probability of surviving an additional year for a patient who has already survived 2 years is calculated by dividing the 3-year Kaplan-Meier survival estimate by the 2-year K-M survival estimate.

Results/Outcome(s): 13 studies including 490 patients were analyzed. Actuarial disease-free survival (DFS) at 1, 2 and 3 years was 91.1%, 84.5% and 78.7% respectively. The probability of remaining disease-free for an additional year if the patient survived without disease at 1 and 2 years, was 92.7% and 93.1% respectively. Similar trends

were observed when local regrowth-free survival (LRFS) was analyzed. LRFS at 1, 2 and 3 years was 97%, 89.8% and 84.4% respectively. The probability of remaining local regrowth-free for an additional year if the patient survived without local regrowth at 1 and 2 years was 92.6% and 93.9% respectively.

Conclusions/Discussion: Patients that achieve 1-year disease-free after non-operative management following CRT and cCR have <10% risk of developing recurrences in the following years of follow-up. This information may be useful for standardization of surveillance strategies after the first year of follow-up without recurrence. Also, a sustained cCR for at least one year may represent a significant milestone in the successful outcome or organ-preservation in these patients.

WHEN LESS IS MORE: NEOADJUVANT SHORT-COURSE INTENSITY-MODULATED RADIATION THERAPY FOLLOWED BY CONSOLIDATION CHEMOTHERAPY FOR RECTAL CANCER IS ASSOCIATED WITH HIGH COMPLETE RESPONSE RATE.

LT6

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Purpose/Background: Neoadjuvant chemoradiation followed by surgery is the standard of care for locally advanced rectal cancer. The current regimen in United States consists on preoperative 5-Fluorouracil based chemotherapy associated with long course radiation (50.4 Gy). This regimen is associated with complete tumor response rates between 10 and 30%, but is associated with radiotoxicity. A new regimen of short course intensity-modulated radiation therapy (IMRT) followed by consolidation chemotherapy (4 cycles) 2 weeks after radiation has been proposed. Our aim was to evaluate the response rate of this new regimen in our institution.

Methods/Interventions: Patients who received neoadjuvant short-course radiation followed by consolidation chemotherapy for treatment of rectal cancer adenocarcinoma between August 2017 and July 2018 were evaluated. Patients with stage IV disease, recurrent rectal cancer, inflammatory bowel disease, or other concomitant neoplasias were excluded. Preoperative treatment consisted on 25 Gy of radiation divided in 5 fractions of 5 Gy delivered daily for 5 days, using IMRT. After 2-week break, patients underwent systemic chemotherapy (FOLFOX - 4 cycles / 8 weeks). Patients were reevaluated 4 weeks after finishing the chemotherapy with flexible endoscopy and MRI. Patients with complete clinical response were offered to undergo surgery or Watch and Wait. Patients with incomplete clinical response underwent surgical treatment. For those who underwent surgery, the cancer response

to neoadjuvant treatment was assessed by a gastrointestinal pathologist using the American Joint Committee on Cancer tumor regression grade (TRG 0 – complete response, TRG 1 – isolated tumor cells remaining, TRG 2 – residual cancer outgrown by fibrosis, TRG 3 – extensive residual cancer).

Results/Outcome(s): Between August 2017 and July 2018, 21 patients with locally advanced rectal cancer received short course intensity-modulated radiation therapy followed by consolidation chemotherapy. The median age was 51 years (range 38 - 77). Most patients were male (15). Before neoadjuvant therapy, the mean tumor size was 4.9 ± 2.4 cm, and the average distance from the tumor to the anal verge was 6.6 ± 4.2 cm. In pre-treatment MRI staging, 17 patients had stage 3 disease (Tx N1-2), and 4 patients had stage 2 disease (T3-4 N0). When patients were re-staged by MRI after chemoradiation, 8 patients had complete response, 5 patients had stage 1 (T1-2 N0), 2 patients had stage 2 (T3-4 N0), and 6 patients had stage 3 disease (Tx N1-2) (table). At endoscopic evaluation after neoadjuvant therapy, 9 patients had only a scar, with no visible tumor left. Five patients who achieved complete clinical response, assessed by MRI and endoscopy, opted for Watch and Wait (no surgery). All of those patients have sustained clinical response in this short follow-up period. Out of 16 patients who underwent surgery, 6 were complete pathological responders (TRG 0), 8 were partial responders (2 patients TRG 1, and 6 patients TRG 2), and 2 patients were non-responders (TRG 3) in the pathological assessment. The complete tumor response rate was 52% with the short course radiation regimen, when taking together patients with complete pathological response (6 patients – 28%) and sustained complete clinical response followed by Watch and Wait (5 patients -24%).

Conclusions/Discussion: Neoadjuvant short-course radiation followed by consolidation chemotherapy for rectal adenocarcinoma is associated with high tumor response rate. This chemoradiation regimen includes the

benefits of tumor shrinkage and high rate of complete response. Short-course radiation followed by systemic chemotherapy seems to be at least as effective as the current standard of care, while affording the advantage of systemic therapy in the neoadjuvant setting.

OPIOID PRESCRIPTIONS AFTER COLORECTAL SURGERY INCREASED AFTER IMPLEMENTATION OF THE CONTROLLED SUBSTANCES ACT.

LT7

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Purpose/Background: Opioid abuse has sparked a public health crisis in the United States, with 10.7 million people misusing prescription opioids in 2014 alone. Opioids are the cause of nearly two-thirds of all drug-related deaths in the United States, and many people who misuse opioids obtain pills from friends or family members with legal prescriptions. Due to growing concern about the opioid epidemic, Congress passed new regulations on opioid prescriptions under the Controlled Substances Act (CSA), which took effect in October 2014. Under this act, physicians were limited to prescribing a 30-day supply of oral opioids without associated refills. Because surgeons frequently prescribe opioids for pain control after operations, this legislation is likely to have changed their prescribing habits. With new restrictions on refills, surgeons may feel obligated to prescribe greater quantities of opioids up front in order to minimize the number of follow-up visits patients have to make to request refills. In this study, we sought to identify potential changes in opioid prescribing patterns within an elective colorectal surgery practice as a result of this legislative change in October 2014. We hypothesized that an unintended consequence

LT6 Pre and post-chemoradiotherapy (CRT) TNM stage based on MRI, and post-surgery pathological TNM stage for patients who underwent neoadjuvant short-course radiation followed by consolidation chemotherapy

Stage	Pre CRT (MRI stage) (n)	Post CRT (MRI stage)(n)	Post Surgery (Pathologic stage) (n)
Watch and Wait group (n=5)			
T0 N0	-	5	-
T3/T4 N0	2	-	-
T1/T2 N+	2	-	-
T3/T4 N+	1	-	-
Surgery group (n=16)			
T0 N0	-	3	6
T1/T2 N0	-	5	3
T3/T4 N0	2	2	1
T1/T2 N+	3	1	1
T3/T4 N+	11	5	5

of this legislation would be an increase in the quantity of opioids prescribed at patient discharge.

Methods/Interventions: This is a retrospective study of patients undergoing elective colorectal surgery at a single institution over a five-year period. A total of 443 patients were intentionally grouped into a pre-CSA group (January 1, 2012 to October 5, 2014) and a post-CSA group (October 6, 2014 to December 31, 2016) to capture the period surrounding the new legislation. The primary outcome was total milligram morphine equivalents (MME) of opioid pain medication prescribed at discharge. Secondary outcomes included total number of pills prescribed, total MME of opioid pain medications refilled in the outpatient setting, and numeric postoperative pain scores. Univariate analysis and multivariable linear regression analysis were used to test the effect of the legislation on the primary and secondary study outcomes.

Results/Outcome(s): Patients in the post-CSA group were found to have higher MME prescribed at discharge [719 (\pm 593) v. 660 (\pm 548); $p = 0.03$], higher mean total quantity of pills prescribed at discharge [98 (\pm 106) v. 87 (\pm 63); $p = 0.05$], and higher mean total quantity of pills prescribed in the outpatient setting [77 (\pm 117) v. 68 (\pm 83), $p=0.05$] compared to the pre-CSA group. There was no significant difference in MME prescribed in the outpatient setting for the post-CSA group compared to the pre-CSA group [567 (\pm 548) v. 610 (\pm 1107); $p = 0.07$]. The post-CSA group reported a lower maximum pain score (7.4 v 7.9; $p = 0.01$) as well as lower average pain scores on postoperative day (POD) 0 (2.9 v 3.4; $p = 0.04$), POD 1 (3.7 v 4.2; $p = 0.02$), and POD 2 (3.7 v 3.8; $p = 0.03$). In the multivariable analysis, the post-CSA group was significantly associated with a higher total MME prescribed at the time of discharge compared to the pre-CSA group ($p = 0.01$).

Conclusions/Discussion: In this retrospective study of a colorectal surgery practice at a single academic center, surgeons prescribed higher MME and quantities of pills after the Controlled Substances Act took effect despite patients reporting lower in-hospital postoperative pain scores. This increase in opioids at discharge did not

reduce the quantity prescribed later in the outpatient setting. This study would suggest that efforts to minimize opioid prescriptions after surgery through legislation could result in the unintended consequence of increasing the amount of opioids prescribed. Excessive opioid prescriptions could potentially increase the number of pills that become available for diversion and misuse. It is imperative that we continue efforts in pursuit of opioid avoidance. Successful intervention efforts rely on a combined effort of stewardship from our prescribers with a focus on multimodal analgesia including non-pharmacologic interventions, education of our surgical patients, and collaboration to increase understanding at the legislative level.

OPIOID PRESCRIBING PATTERNS AFTER ANORECTAL SURGERY.

LT8

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Purpose/Background: Recent evaluations of general surgery prescribing practices suggest that many patients have excess opioid pain medications prescribed after their procedures. Prospective data and expert opinion has generated prescribing guidelines for common abdominal surgery procedures; no similar data exists regarding anorectal surgery. The purpose of our study was to determine current practice patterns and examine factors which influence opioid prescribing after anorectal procedures.

Methods/Interventions: An anonymous online survey of ASCRS members was performed via SurveyMonkey. Respondent demographics, prescribing habits, and factors influencing opioid prescribing patterns were analyzed. Common opioid medication doses were converted to morphine equivalents (ME, milligrams of morphine). Student's t-test and ANOVA were used to compare means where appropriate. Multivariate analysis was performed to evaluate the effect of significant covariates from univariate analysis on ME prescribed.

LT7 Opioid prescriptions and pain scores before and after implementation of the Controlled Substances Act

Outcome	Pre-CSA	Post-CSA	Significance (p-value)
Total MME at discharge (mg)	660 (\pm 548)	719 (\pm 593)	0.03
Quantity of pills at discharge	87 (\pm 63)	98 (\pm 106)	0.05
Total MME as outpatient (mg)	610 (\pm 1107)	567 (\pm 548)	0.07
Quantity of pills as outpatient	68 (\pm 83)	77 (\pm 117)	0.05
Average pain POD 0 (0-10 scale)	3.4 (\pm 2.8)	2.9 (\pm 2.6)	0.04
Average pain POD 1 (0-10 scale)	4.2 (\pm 2.3)	3.7 (\pm 2.3)	0.02
Average Pain POD 2 (0-10 scale)	3.8 (\pm 2.2)	3.7 (\pm 1.9)	0.03
Highest pain score (0-10 scale)	7.9 (\pm 2.1)	7.4 (\pm 2.3)	0.01

Values of outcomes are listed for pre-CSA group and post-CSA group along with standard deviations. Differences were considered significant for p -values ≤ 0.05 .

Results/Outcome(s): There were 519 responses to the survey (16.5%); demographic information is in Table 1. Responders most commonly performed 11-20 (53%) or <10 (24%) anorectal procedures per month. Most (73%) prescribed a standard number of opioid pills for each procedure. The mean milligrams of ME prescribed overall was 129 (SD 82) and by procedure was: hemorrhoidectomy 188 (111), condyloma treatment 149 (105), fistulotomy 146 (98), advancement flap 144 (97), LIFT 140 (93), abscess drainage 107 (91), sphincterotomy 105 (85), and chemodeneration for fissure 34 (64). 98% of surgeons utilize local anesthesia and 91% reported that they typically prescribe one or more adjunctive medications in addition to or instead of opioids (most common: NSAIDS 72%, acetaminophen 55%, topical lidocaine 28%, gabapentin 13%). Most (95%) reported that fewer than 25% of patients ask for refills, but 53% always or usually provide one when asked. Most (79%) reported that their patients' pain was very or fairly well controlled at their postoperative visit. Respondents who reported patient satisfaction/phone calls, procedure difficulty, and patient substance abuse history as significant considerations tended to prescribe

higher ME ($p<0.001$). Less than half (43%) of surgeons reported that they check their state narcotic database always or most of the time despite awareness of its existence (87%); however this was not significantly associated with the amount of ME prescribed. Consideration of the potential for diversion or knowledge of a community opioid problem was not associated with ME prescribed ($p=0.18$). On univariate analysis, respondents who prescribe a standard quantity of opioids, those who usually prescribe a refill when asked, and those with a high percentage of patients asking for refills tended to prescribe a higher initial ME ($p<0.0001$). Respondents who use adjunctive acetaminophen prescribed significantly less ME ($p<0.0001$), while there was no association between any other adjunctive medication and ME prescribed. Respondents who perform >10 anorectal procedures per month, work in a community hospital, and practice in the south or west prescribe significantly more ME ($p<0.0001$). Gender, practice setting, and years in practice were not significant predictors of ME prescribed. On multivariate analysis, prescribing a standard quantity of opioids, having patients that often ask for refills, providing refills when asked, not using adjunctive

LT8 Table 1: Demographic Information of Survey Respondents

		N=519 (%)
		*not all respondents answered all questions
Gender	Male	365 (73.6)
Years in Practice	<5	111 (22.4)
	6-10	93 (18.8)
	11-20	115 (22.2)
	21-30	107 (21.6)
	>30	69 (13.9)
	Practice Location	Midwest
Northeast		112 (22.8)
South		151 (30.8)
West		83 (16.9)
Outside US		40 (8.2)
Area of Practice	Urban	271 (54.6)
	Suburban	199 (40.1)
	Rural	21 (4.2)
	Other	5 (1)
Type of Hospital/Practice	Academic medicine/tertiary center	221 (44.6)
	Community hospital	242 (48.8)
	Public/City hospital	6 (1.2)
	VA hospital	7 (1.4)
	Military hospital	5 (1)
	Other	15 (3)
Proportion of Colorectal Practice	<25%	17 (3.4)
	25-50%	40 (8.1)
	51-75%	53 (10.7)
	>75%	386 (77.8)

acetaminophen, consideration of procedure difficulty, and region of practice (west and south) each remained associated with a higher initial ME prescribed.

Conclusions/Discussion: Most surgeons prescribe a standard quantity of opioids for each patient and each procedure, regardless of patient factors. However, the range of opioid prescribing practices amongst ASCRS members varies widely. Prospective data regarding patient opioid needs following anorectal surgery will be helpful to guide practice.

OUTCOMES AFTER INTRACORPOREAL VERSUS EXTRACORPOREAL ANASTOMOSIS IN MINIMALLY-INVASIVE COLORECTAL SURGERY.

LT9

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Purpose/Background: Intracorporeal anastomosis (ICA) during minimally invasive colorectal resections (robotic/laparoscopic) has been theorized to have advantages over extracorporeal anastomosis (ECA). It avoids exteriorization of the colon with exposure to room air, traction on the mesentery, and extensive manipulation for dissection and placement of an EEA stapler anvil. We previously described the technique of a robotic single-dock intracorporeal anastomosis for rectosigmoid resections. The purpose of this study was to compare outcomes between robotic and laparoscopic ICA and ECA for right hemicolectomy, sigmoid colectomy, and low anterior rectal resections (LAR). We hypothesized that ICA was associated with decreased rates of ileus and length of stay (LOS).

Methods/Interventions: Patients who underwent laparoscopic or robotic colorectal resection performed at a tertiary referral center from 2015 to 2018 were retrospectively analyzed. Minimally-invasive sigmoidectomy, right hemicolectomy, and LAR for benign or malignant disease with primary stoma-free anastomosis were included. ICA was defined as laparoscopic or single-dock robotic resection with intracorporeal colon resection and anastomosis, including anvil placement, whereas ECA was defined as exteriorization of colon other than the specimen for resection, anvil placement, or anastomosis. Exclusion criteria included conversion to open surgery, creation of a stoma, or a hand-sewn coloanal anastomosis. The patients were grouped into ICA versus ECA. Data analyzed and compared included patient demographics, pre-operative characteristics, operative time, peri- and postoperative morbidity, and LOS. Statistical analysis was performed on SAS software using 2-tailed t-test for continuous variables, and chi-squared or fisher exact test for categorical data.

Results/Outcome(s): Of 155 patients identified, 112 met criteria for study with 31 ICAs (10 LARs, 7 right hemicolectomies, and 14 sigmoidectomies) and 81 ECAs

(27 LARs, 23 right hemicolectomies, and 31 sigmoidectomies). There were no significant differences between the groups for gender, ASA, BMI, or preoperative chemoradiotherapy. Patients in the right hemicolectomy ICA group were significantly older than the ECA group (76.4 vs. 64.8, p=0.047), and the combined ICA group had a higher rate of prior abdominopelvic surgery (65% vs 43%, p=0.044). Average LOS was significantly shorter for ICA (3.7 vs 5.1 days, p=0.043). While the operative times were significantly longer for ICA in right hemicolectomy (255 vs 168 min, p<0.05) and sigmoidectomy (254 vs 140 min, p<0.05), the overall complication rate was lower in the ICA group (16.1% vs 25.9%, p=0.027). There were 4 anastomotic leaks, all of which occurred in the ECA group. While the rate of anastomotic leak and ileus favored ICA and ICA subgroups, these did not reach statistical significance.

Conclusions/Discussion: Minimally-invasive ICA was associated with favorable outcomes compared to ECA with significantly lower overall post-operative complications and shorter LOS despite increased operative time. ICA for right hemicolectomy and rectosigmoid resections may offer an advantage and should be further evaluated.

	Right		LAR		Sigmoid		Total	
	ECA	ICA	ECA	ICA	ECA	ICA	ECA	ICA
n	23	7	27	10	31	14	81	31
LOS	4.9 ± 3.5	3.3 ± 1.2	5.4 ± 4.6	3.3 ± 0.7	5.0 ± 2.9	4.2 ± 1.6	5.1 ± 3.7	3.7 ± 1.4
p (tt)		p=0.21		p=0.16		p=0.37		p=0.04
Any Complication	5	2	8	0	8	3	21	5
Rate (%)	21.7%	28.6%	29.6%	0%	25.8%	21.4%	25.9%	16.1%
p (fisher)		p=1		p=0.08		p=1		p=0.03
Leak	0	0	3	0	1	0	4	0
Rate (%)	0%	0%	11.1%	0%	3.2%	0%	4.9%	0%
p (fisher)		p=1		p=0.52		p=1		p=0.49
Ileus	4	1	2	0	5	1	11	2
Rate (%)	17.4%	14.3%	7.4%	0%	16.1%	7.1%	13.6%	6.5%
p (fisher)		p=1		p=1		p=0.65		p=1

ARE THERE DIFFERENCES IN ADENOMA RATES BY RACE FOR PATIENTS YOUNGER THAN 50?

LT10

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Purpose/Background: Guidelines for screening colonoscopy have traditionally called for average risk patients to begin regular screening at age 50. Data from the Surveillance, Epidemiology, and End Results Program from the National Cancer Institute have shown increased incidence of colorectal cancer in African Americans compared to Whites. Furthermore, studies have suggested that African Americans are more likely to present with cancer at a younger age than White patients, resulting in some institutions recommending that average risk African Americans begin colon cancer screening at age 45 rather than 50. To assess if early screening for this population is indicated, we merged colonoscopy reports, electronic medical records, and pathology reports to create a new

database of patients treated within the Ochsner Health System. We hypothesize that average risk young (<50 years old) African Americans will have higher rates of adenomatous polyps and cancers than low risk young Caucasian patients.

Methods/Interventions: We examined colonoscopy procedure reports, the resulting pathology reports, and clinical data collected between 2012 and 2018 housed in 3 different systems within the Ochsner Health System, Louisiana's largest integrated delivery health system. From each colonoscopy report we retrieved the procedure indication as well as the number and size of polyps. Resulting pathology reports were retrieved using the patient's medical record number and colonoscopy procedure date. Patient details were also used to query our enterprise data warehouse for relevant structured data such as demographics, medical history, prior and subsequent procedure dates, whether the colonoscopy ultimately resulted in a cancer diagnosis, and details of subsequent cancer treatment. We then selected first colonoscopies for average risk patients using procedure codes and eliminating any high risk patients such as those with a strong family history or those receiving colonoscopy for symptoms of disease. Patients were then evaluated by age, gender, and race using chi-squared to assess for any differences in rates of adenomas or cancers.

Results/Outcome(s): We identified 35251 patients undergoing an initial screening colonoscopy between 2012 and 2018 at an average age of 57. 63% of these patients were Caucasian, 32% were African American, and 1.4% were Asian. 96% had their initial scope at age 50 or older. Young patients were less likely to have polyps than those aged 50 or greater. Compared to aged matched White patients, Black patients aged 40-44 were less likely to have any polyps but had no significant difference in adenomatous polyps or cancers (Table 1). This is also true for patients aged 50 or older. Interestingly, Black patients aged 45-49 were less likely to be diagnosed with cancer within 6 months of their initial colonoscopy compared to White patients (0.44% vs 1.87%, $p = 0.0184$). When this data is further analyzed by gender, no significant difference in rates of polyps, adenomas, or cancers is appreciated between White/Black men or White/Black women at any age range. African American patients who developed colorectal cancer did so at an earlier age than Caucasian patients (60 vs 63 years old, $P = 0.0133$).

Conclusions/Discussion: We did not find a higher rate of adenoma or adenocarcinoma in young Black patients compared to young White patients on initial screening colonoscopy. This may be due to higher rates of compliance with screening guidelines or improved access to healthcare/health insurance. In fact, a recent study found that African American patients treated within the Ochsner Health Care system were more likely to receive colonoscopy when recommended by their primary care physician than their Caucasian counterparts. This study is

limited in that all patients were examined in Southeastern Louisiana and therefore our findings may not be representative of the general American population. We plan to gather further data to compare sizes of polyps and stage of cancer at diagnosis.

	Number of Patients	Patients with polyps	P Value	Patients with adenomas	P Value	Diagnosis of CRC within 6 months	P Value	Diagnosis of CRC Ever	P Value
All Male	16500	9887 (59.92)	--	6665 (40.39)	--	143 (0.87)	--	157 (0.95)	--
All Female	17883	8356 (46.73)	<0.0001	5020 (28.07)	<0.0001	118 (0.66)	0.0252	144 (0.81)	0.1643
White	22229	12056 (54.24)	--	7663 (34.47)	--	173 (0.78)	--	201 (0.90)	--
Black	11333	5778 (50.98)	<0.0001	3754 (33.12)	0.0136	84 (0.74)	0.6911	95 (0.84)	0.5778
Asian	501	239 (47.70)	0.0037	164 (32.73)	0.4176	2 (0.40)	0.3364	3 (0.60)	0.4804
UNDER 40									
White	197	59 (29.95)	--	29 (14.72)	--	3 (1.52)	--	4 (2.03)	--
Black	60	19 (31.67)	0.8001	5 (8.33)	0.2017	0	N/A	0	N/A
Asian	2	1 (50.00)	0.5397	0	N/A	0	N/A	0	N/A
40-44									
White	168	81 (48.21)	--	37 (22.02)	--	1 (0.60)	--	1 (0.60)	--
Black	108	36 (33.33)	0.0148	15 (13.89)	0.0924	1 (0.93)	0.7536	1 (0.93)	0.7536
Asian	4	3 (75.00)	0.2908	2 (50.00)	0.1878	0	N/A	0	N/A
45-49									
White	466	232 (49.79)	--	123 (26.39)	--	5 (1.87)	--	5 (1.87)	--
Black	675	293 (43.41)	0.0336	165 (24.44)	0.4562	3 (0.44)	0.0184	3 (0.44)	0.0184
Asian	10	2 (20.00)	0.0625	1 (10.00)	0.2431	0	N/A	0	N/A
50+									
White	21390	11679 (54.60)	--	7473 (34.94)	--	163 (0.76)	--	190 (0.89)	--
Black	10487	5429 (51.77)	<0.0001	3569 (34.03)	0.1087	80 (0.76)	1.000	91 (0.87)	0.8577
Asian	254	96 (37.80)	<0.0001	65 (25.59)	0.0019	1 (0.39)	0.4985	3 (0.62)	0.6482

CRC, colorectal cancer. Significance set at p -value <0.05 (bold above)

DOES THREE-DIMENSIONAL MRI FOR PERIANAL CROHN'S DISEASE HELP THE COLORECTAL SURGEON? - A PROSPECTIVE STUDY.

LT11

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Purpose/Background: Fistula-in-ano related to Crohn's disease has significant clinical sequelae with 20% of patients with Crohn's disease requiring perineal surgery at some stage. The surgical management of fistula-in-ano requires accurate evaluation of the fistula anatomy to ensure that sepsis is controlled through adequate drainage whilst preserving the anal sphincters. The added complexity of Crohn's fistulae can make surgical management challenging and in some cases pre-operative imaging can be performed to help delineate the anatomy. Magnetic resonance imaging (MRI) is the modality of choice for pre-operative assessment, however interpretation by non-radiologists can be difficult in complex cases. A novel three-dimensional (3D) modelling technique using MRI images has been developed at St Vincent's Hospital Melbourne to accurately isolate fistula tracts and define their relationship to the sphincter complex. This can be used to create a physical model using 3D printing. The development of the 3D modelling technique and physical model has the potential to aid surgical decision-making by improving spatial orientation for the surgeon. This may be especially relevant in complex cases where there are multiple tracts with multi-directional branches. The aim of this study was to evaluate the utility of 3D modelling (both imaging and printed models) in perianal Crohn's fistulae for the colorectal surgeon in terms of understanding of

anatomy, time saved in planning and overall usefulness for complex anal fistulae.

Methods/Interventions: Participants: The 5 participants in this study are all consultant surgeons in the Department of Colorectal Surgery at St Vincent's Hospital Melbourne (quaternary referral centre for complex inflammatory bowel disease). **MRI Selection:** Ten patients with complex perianal Crohn's disease, who underwent a pelvic MRI for Crohn's disease at St Vincent's Hospital Melbourne during the period March 2016 - March 2017 were selected. The 3D models were generated from their MRIs using "Seed-based region growing technique" and physical models were created by a 3D printer. The original 2D MRIs, 3D images and physical models were given a de-identified number (1-10) signifying each patient. **Study Activity:** Each of the five participants underwent a single session with the principal investigator. For each patient, the participant was given a short vignette of the clinical situation including a diagram of perianal examination findings. They then viewed the standard 2D MRI scan accompanied with the radiologist's report. During this time they filled out a standard proforma indicating their perceived anatomy of the fistula and also recorded their operative plan. They were then given the 3D images on the computer, which they were able to rotate on screen in order to assess the anatomy from all angles. They then received the physical printed model. Assessment was then made to see whether there was a change in the understanding of the anatomy and/or surgical management plan. After reviewing the ten clinical scenarios the participants completed a short survey on their perception of these new modalities. The survey contained 5 questions regarding the utility of MRI considering time saved, understanding of anatomy and overall usefulness on a 5 point scoring system which would allow later statistical analysis.

Results/Outcome(s): Models were completed in November and data collation is expected to be completed by early January. Initial results suggest that 3D imaging may be useful in complex cases as additional side branches were better appreciated when the 3D images were observed. There appears to be time saved in pre-operative planning and there is also a reduced need to see a radiologist to go through images prior to surgery.

Conclusions/Discussion: Perianal fistulating Crohn's disease remains a morbid condition that is difficult to treat especially when severe and complex. MRI is a useful imaging technique, however imaging in complex disease along with lengthy reports can make interpretation of anatomy difficult for the surgeon. Our novel 3D imaging technique takes only an additional six minutes of sequence time and an additional 15 minutes for sequencing by the radiologist. It is however reliant on the skill of the radiologist to identify fistula tissue from surrounding structures. The additional time and costs involved with such imaging may be best utilised on the most complex cases where complicated communications and side branches could

be otherwise missed at examination under anaesthetic (EUA). Embracing novel technology to enhance patient outcomes is paramount for advancing surgical care. To date this is the first study looking at the role and benefits of using 3D imaging and printed models to assist surgeons in the management of perianal Crohn's disease. Initial data appears promising. These modalities may become routine in the management of this complex disease.



IS SYNOPTIC REPORTING NECESSARY FOR CROHN'S DISEASE SURGICAL PATHOLOGY? VARIABILITY IN PATHOLOGY REPORTS AT TWO INFLAMMATORY BOWEL DISEASE REFERRAL CENTERS.

LT12

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Purpose/Background: Crohn's disease (CD) is a chronic remitting, relapsing gastrointestinal disease characterized by transmural inflammation resulting in fibrostenotic or penetrating phenotypes. Despite the growing number of medications approved for the treatment of CD, up to 60% of patients will require surgical resection for medically refractory disease, with many requiring additional surgery. With multiple phenotypes of CD and varying degrees of disease severity, histopathology could play an important role in guiding postoperative prophylactic medical therapy or better understanding the natural history of the disease and risk factors for recurrence. We sought to determine 1) consistency in histopathologic reports within single referral centers for inflammatory bowel disease and 2) consistency in histopathologic reports across referral centers to highlight pathologic reporting in CD.

Methods/Interventions: A retrospective review was conducted of the most recent 300 surgical pathology reports of CD patients undergoing ileocolic resection at two inflammatory bowel disease referral centers. Patients with prior ileocolic resection or resection performed for malignancy were excluded leaving 209 patients from each institution for analysis. Preoperative clinical and disease characteristics, including disease phenotypes (fibrostenosing vs penetrating) were obtained from prospectively maintained databases and medical records at both institutions. Gross histopathology characteristics extracted from

the pathology reports included specimen length, gross margins, grade of inflammation, stenosis, linear ulcerations, fistula, and creeping fat. Microscopic characteristics included microscopic margins, goblet cell preservation, transmural inflammation, mucosal disruption, granulomas, fibrosis, and neural hyperplasia. The frequency in reporting each of these characteristics was calculated. Student t-tests were used to compare differences in means and Chi-square tests to detect differences in frequencies of histopathology characteristics reported between the two institutions.

Results/Outcome(s): There were no significant differences in patient age or gender between the two institutions: Institution A (n=209), mean age = 37.1 years old (SD=15.5), 51.2% female; Institution B (n = 209), mean age=34.1 years old (SD=16.7;p=0.06), 53.1% female (p=0.77). At Institution B, a greater proportion of patients had fibrostenotic disease (89%) than penetrating disease (11%) compared to Institution A (fibrostenosing 72%, penetrating 28%; p<0.0001). There were significant differences in the reporting of gross and microscopic histopathology findings between the two institutions (Table 1).

Conclusions/Discussion: The significant variability within and across institutions' histopathologic reports of CD patients undergoing primary ileocolic resection highlights the need for synoptic reporting. Without consistent reporting, it is difficult to answer meaningful questions

regarding risk factors for disease recurrence. It is important to stratify which patients should be receiving postoperative medical therapy, and understand if surgeons should be basing their length of bowel resection on gross or microscopic margins. In order to provide a thorough recording of pathological findings, perhaps a reliable synoptic templating system for CD patients will improve both histopathologic reports and facilitate treatment decisions for patients and surgeons alike.

RADIOFREQUENCY TREATMENT FOR FECAL INCONTINENCE: LONGEST TERM RESULTS.

LT13

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Purpose/Background: Temperature-controlled radiofrequency (RF) energy delivery to the sphincter complex (through the SECCA® device) has been proposed as an option for those patients not susceptible to a major surgical procedure. It was used for the first time as a treatment for fecal incontinence at the Instituto Nacional De Ciencias Médicas y Nutrición Salvador Zubirán (INNSZ) in Mexico during 1997, the 60-months follow-up showed improvement in fecal incontinence symptoms severity

LT12 Table 1. Comparison of reporting frequencies for gross and microscopic histopathology characteristics of ileocolic specimens at Institution A and B.

Histopathology characteristics	Institution A #(%)	Institution B #(%)	p-value
Gross			
Total specimen length	3 (1.4)	209 (100.0)	< 0.0001
Length of ileum	207 (99.0)	209 (100.0)	0.16
Length of colon	206 (98.5)	209 (100.0)	0.08
Size of appendix	161 (77.0)	186 (89.0)	0.001
Margin status	79 (38.0)	166 (209)	< 0.0001
Proximal margin	46 (22.0)	164 (78.4)	< 0.0001
Distal margin	34 (16.2)	161 (77.0)	< 0.0001
Grade of inflammation	188 (90.0)	50 (23.9)	< 0.0001
Stenosis	173 (82.8)	157 (75.1)	0.06
Linear ulcerations	152 (72.7)	78 (37.3)	< 0.0001
Fistula	66 (31.6)	83 (39.7)	0.08
Creeping fat	142 (67.9)	67 (3.1)	< 0.0001
Microscopic			
Margin status	12 (5.7)	175 (83.4)	< 0.0001
Proximal margin	8 (3.8)	175 (83.4)	< 0.0001
Distal margin	6 (2.9)	170 (81.3)	< 0.0001
Goblet cell preservation	0	2 (1.0)	0.16
Transmural inflammation	169 (80.9)	58 (27.8)	< 0.0001
Mucosal disruption	118 (56.5)	199 (95.2)	< 0.0001
Granulomas	100 (47.8)	164 (78.5)	< 0.0001
Fibrosis	0	34 (16.3)	< 0.0001
Neural hyperplasia	0	53 (25.3)	< 0.0001

and quality of life. The purpose of this study is to extend the follow-up period to evaluate the long term (15 years) functional results obtained after RF energy delivery with the SECCA® device as a treatment for fecal incontinence.

Methods/Interventions: A long-term follow-up from the original prospective study in which radiofrequency energy was delivered to the sphincter complex using the SECCA® device as a treatment for fecal incontinence was performed. The Cleveland Clinic Florida Fecal Incontinence scale (CCF-FI), Fecal Incontinence-related Quality of Life Score (FIQLS), and 36-Item Short Form survey (SF-36), as well as endorectal ultrasound (ERUS) and anorectal manometry (ARM) were applied at 15 years. Differences between baseline and follow-up were analyzed by using paired *t*-test and Wilcoxon signed-rank test.

Results/Outcome(s): Temperature-controlled radiofrequency energy was applied to a total of 19 patients from 1999 to 2001, during the evaluation at 15 years follow-up was lost on eight patients and one died due to unrelated causes; therefore, the total population of the study included 10 patients, all females. The application mean age was 57.9 ± 7.3 years (range, 47-74), the fecal incontinence mean duration was 7.1 ± 6.12 years (range, 1-21). The following FI related causes were found: obstetric trauma (40%), hemorrhoidectomy (30%), combined causes (20%) and fistulotomy (10%). Prior to RF energy delivery, mild FI (CCF-IF <8pts) was found in 20%, moderate FI (9-14pts) and severe FI (> 15pts) were found in 30% and 50% of the patients, respectively. ERUS showed internal and external anal sphincter combined defects in 40%, external anal sphincter defects in 20%, and internal anal sphincter defects in 10% of the patients, no lesions were found in 30% of the patients. There were no additional findings of new defects or scar tissue during the 15-year follow-up. There was no correlation between the presence and type of lesions with the clinical response obtained. ARM found hypotonic anal sphincter in 100% of the patients and rectal hyposensitivity in 40%; the recto-anal inhibitory reflex was present and unchanged in 100% of the patients. When comparing obtained data at the baseline with the 15-year follow-up, no significant changes were found for mean manometric resting pressure (33.05 to 35.9, $p = 0.64$), max squeeze pressure (82.8 to 77.4, $p = 0.34$), rectal sensation volume threshold (32.0 to 30.6, $p = 0.87$) and max tolerable rectal sensation volume (196 to 157.3, $p = 0.57$). When assessing FI symptoms severity with the CCF-FI scale, there was no statistically significant long-term improvement (13.8 to 12.4, $p = 0.246$), only one patient (10%) obtained improvement > 50%. No significant changes in the Fecal Incontinence Quality of Life Score were observed, including lifestyle (2.39 to 2.13, $p = 0.233$), coping (1.91 to 1.92, $p = 0.969$) and embarrassment (1.66 to 1.86; $p = 0.436$), however, significant worsening was found in the depression category

(2.47 to 1.60, $p = 0.001$). The mean SF-36 Health Questionnaire showed significant worsening in the mental (36.7 to 25.8, $P < 0.001$) physical function (53.1 to 41.4, $P = 0.014$) and social function (50.9 to 31.2, $P = 0.001$) composites. No complications related to the SECCA® procedure were found on the long-term follow-up. In this study group.

Conclusions/Discussion: Previous studies carried out in our institution demonstrated a SECCA® therapeutic effect durability up to 5 years; however, our 15-year follow-up results are not very encouraging because when analyzing the data in this study group, the patients who initially responded seem to lose their improvement with the time and only a small number of patients presented a significant long-term clinical response. On the other hand, 30% of our patients required some additional surgical procedure as FI treatment. This is the study with the longest follow-up available today. According to our results, the SECCA® procedure did not prove useful as a treatment for long-term fecal incontinence. Due to the scarce information that is currently available about the long-term durability of this treatment modality, we consider that, despite its limitations, the data obtained from this study will provide an important contribution in the decision making process for the treatment of fecal incontinence.

IS INTERVENTION AT TIME OF VISIBLE CONFIRMATION OF EXTERNAL RECTAL PROLAPSE “TOO LITTLE, TOO LATE” TO OFFER A MEANINGFUL SURGICAL IMPACT ON PATIENT BOWEL FUNCTION?

LT14

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Purpose/Background: Studies examining functional outcomes for specific rectal prolapse operations, including a recent randomized trial, did not provide a clear answer as to whether a particular surgical approach (abdominal vs. perineal) is associated with differences in long term bowel function. The aim of this study was to utilize a comprehensive set of functional surveys before and after surgery to (1) describe changes in function after repair of external prolapse in general and (2) compare changes in bowel function between abdominal and perineal operative approaches in particular.

Methods/Interventions: We prospectively identified adult patients with visible external rectal prolapse or intra-anal intussusception performed between 2012-2017. Abdominal approaches included suture rectopexy, rectopexy with sigmoid resection, and ventral rectopexy. Perineal approaches included perineal proctectomy, Delorme procedure, and stapled transanal resection of

the rectum (STARR). Bowel function was measured at the pre-operative clinic visit and at least 3 months after surgery by mailed survey using the Fecal Incontinence Severity Index (FISI), Fecal Incontinence Quality of Life Score (FIQOL), and the Constipation Severity Index (CSI), which includes an Obstructed Defecation Subscore (ODS). Overall scores and responses to individual items before and after surgery were compared for the overall patient cohort, as well as between approaches with chi square and t tests as appropriate.

Results/Outcome(s): 71/217 patients operated for rectal prolapse during the study period responded to both pre- and post-operative surveys about their bowel function (33% overall response rate, no systematic difference between responders and non-responders). Mean follow up time was 20.9 months (abdominal 17.1+/-14.3 vs perineal 26.7+/-22.3, p=.08). 41 patients (58%) underwent abdominal repairs and were on average younger (63 vs 69 years, p=.07), but had similar baseline comorbidities, and had similar preoperative severity of moderate FI (20.0 ± 15.0 vs 20.2 +/- 16.8; p=0.953). Abdominal patients tended to have higher ODS scores, though this did not reach statistical significance (16.0+/-10.2 vs 10.0+/-12.1 p= 0.059). On preoperative testing, these patients had similarly depressed resting (mean 44.3 vs. 37.0, p=.7, max 61.4 vs. 51.6, p=0.4) and squeeze (118.5 vs. 121.4, p=.8) pressures. Overall, surgical repair of rectal prolapse was associated with an improvement in both ODS (-4.2, p=0.007) and FI (-8.7, <.0001) symptoms, with a reasonable improvement in Depression (+ 0.5, <.0001), lifestyle (+0.4, p<0.001), embarrassment (+0.4, p= 0.0001) and coping (+0.4, p= 0.4).

However, both abdominal and perineal approach patients continued to struggle with symptoms of significant gas, mucus and liquid incontinence after surgery, without a difference in rates by approach. Patients with abdominal repairs were more likely to report a statistical improvement in solid incontinence (complete continence of 42.9 vs. 12.9%, p= 0.03), but not enough to improve their overall FISI scores, which denoted residual mild FI (10.7 vs. 12.4, p=0.8). Abdominal approaches were associated with improved rates of postoperative urgency (58.1% vs 86.4%, p=0.03), and improved depression scores (3.8 vs 3.4, p=.02). Rates of life style alterations, embarrassment and pad usage remained the same.

Conclusions/Discussion: Patients undergoing repair of external rectal prolapse seem to have relative improvements in their bowel function, though many deficiencies persist, with many suffering long term FI to gas, mucus and liquids at 3 months after surgery, regardless of surgical approach. Abdominal surgery may have greater improvements in ODS and solid FI, but approaches leave patients in need of pads indefinitely. This suggests the need for a systematic change in the timing of our intervention on prolapse patients to a point at which the anal sphincter damage caused by this condition is not irreversible and the rectum is not yet “out of the bag”. Studies are needed however to determine best ways to identify rectal prolapse precursor symptoms and pathology in a reliable fashion.

LT13 Symptom and Quality of Life Scores

	Baseline			15 years Follow-up				15 years - Baseline		
	Mean	SD	(Range)	Mean	SD	(Range)	P value*	Mean difference	(CI 95%)	P value†
CCF-FI	13.8	±4.5	(7-20)	12.4	±5.52	(2-20)	NS	1.40	(-1.1, 3.9)	NS
FIQLS – Lifestyle	2.3	±0.62	(1.6-3.2)	2.1	±0.81	(1.1-3.8)	NS	0.26	(-0.2, 0.7)	NS
FIQLS – Coping	1.9	±0.48	(1.2-2.6)	1.9	±0.93	(1-4)	NS	-0.01	(-0.5, 0.5)	NS
FIQLS – Depression	2.4	±0.38	(1.8-3)	1.6	±0.60	(1-2.7)	0.012	0.87	(0.4, 1.2)	0.001
FIQLS – Embarrassment	1.6	±0.49	(1-2.3)	1.8	±0.82	(1-3.7)	NS	-0.20	(-0.7, 0.3)	NS
SF-36 – Mental composite	36.7	±4.11	(60-80)	25.8	±7.33	(16-36)	0.005	10.90	(6.4, 15.3)	< 0.001
SF-36 – Physical function	53.1	±15.38	(38-80)	41.5	±18.71	(10-75)	0.012	11.60	(3.0, 20.1)	0.014
SF-36 – Social Function	50.9	±11.14	(38-70)	31.2	±10.62	(12.5-50)	0.005	19.65	(10.2, 29.0)	0.001

CCF-FI = Cleveland Clinic Florida-Fecal Incontinence scale.

FIQLS = Fecal incontinence Quality of Life Score.

SF-36 = Short Form-36 survey.

* Wilcoxon's signed rank test.

† One-sample paired t-test.

DEFINING ANASTOMOTIC LEAKS FOLLOWING COLORECTAL SURGERY: RESULTS OF A NATIONAL SURVEY.

LT15

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Purpose/Background: Anastomotic leaks (AL) are a rare but dreaded complication following colorectal surgery. Although AL is often used as a metric to compare patient outcomes, there is no standard definition. We previously established the difficulty of achieving consensus on the definition of AL using a Delphi process among a national expert panel of colorectal surgeons. The aim of the present study was to assess the definition of AL among US colon and rectal surgeons.

Methods/Interventions: A web-based, anonymous survey of 17 questions was developed based on results of a previously conducted national expert panel and systematic literature review. The survey was distributed to all members of the American Society of Colon and Rectal Surgeons nationally by compiling a list of surgeons using the membership directory. The survey queried respondents on the definition of anastomotic leaks using a 5-point Likert scale to rate different scenarios. Survey data was collected in November 2018. Three electronic reminders, one week apart, were sent. Survey responses were analyzed using descriptive statistics.

Results/Outcome(s): Of potential 2209 respondents, 649 (29%) responded to the survey. The majority of respondents were male (76%), attending-level surgeons (93%), and practiced colon and rectal surgery as their primary specialty (89%). Respondents were from both community (50%) and academic (47%) practice settings. The distribution of the number of years in practice were as follows: 0-10 years: 39%; 11-20 years: 27%; > 20 years: 34%. Majority of respondents strongly agreed or agreed that the following scenarios represented an AL: Imaging demonstrating extravasation of contrast outside the intestinal lumen at the anastomosis in an asymptomatic postoperative patient requiring no intervention (91%), percutaneous drainage (98%), or re-laparotomy (99%); Imaging demonstrating extravasation of contrast outside intestinal lumen at anastomosis at postoperative day 35 (86%); Postoperative patient with generalized peritonitis and fecal matter from wound (78%); Postoperative patient with localized peritonitis requiring re-exploration showing intense inflammatory reaction and free fluid near the anastomosis (69%); and intra-abdominal abscess close to the anastomosis in postoperative patient with fevers and tachycardia (66%) (Table 1). Less than majority strongly agreed or agreed that the following scenarios represented an AL: Intra-abdominal abscess close to the anastomosis in an asymptomatic postoperative patient (50%); Imaging showing air-bubbles around anastomosis in postoperative

patient (48%); and CT with IV/PO contrast is always necessary to diagnose an AL (14%).

Conclusions/Discussion: In an era when AL is commonly used as a marker of quality of care, there is no universally accepted definition of AL. Contrast extravasation at the anastomosis, regardless of timing related to the surgery, is the clinical scenario with greatest consensus. Radiologic imaging findings (fluid, air-bubbles) and whether the patient is asymptomatic seem to play an important role when US surgeons define AL. Most controversially, half of surgeons do not believe that an abscess near the anastomosis in an asymptomatic patient is a leak. The results of this survey highlight the disparate surgeon definition of AL as well as the pressing need for standardization of the definition of AL given best-practices are often based on clinical trials which utilize AL as patient outcomes.

A THREE-DIMENSIONAL PRINTED PELVIC MODEL IS USEFUL FOR EDUCATION ABOUT LATERAL LYMPH NODE DISSECTION: A RANDOMIZED CONTROLLED TRIAL.

LT16

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Purpose/Background: In Japan, lateral lymph node dissection (LLND) is the standard technique for locally advanced lower rectal cancer. In the West, although LLND was adapted for limited cases such as recurrent or remnant metastasis after chemoradiotherapy, the importance of lateral lymph node dissection has become increasingly recognized. However, it is a difficult technique because of the complex pelvic anatomy involved. Therefore, education regarding pelvic anatomy is important and necessary for LLND. Usually, medical students study anatomy by using an atlas textbook and performing cadaveric dissection. Cadaveric dissection is superior to the atlas for learning because it allows for an understanding of the three-dimensional (3D) relationships between the bones, muscles, vessels, and nerves, but it is concerning some ethical issues. The 3D printed organ model is a new modality for learning anatomical relationships that can help overcome the current ethical problems of dissection. And randomized controlled trials of the heart, skull, and fractured spine have indicated the utility of the 3D model for medical students, which referred only to educating students about simple anatomic structures of the organs. This study evaluated learning efficiency using a 3D model and compared the outcomes to those of using traditional 2D atlas, concerning about LLND.

Methods/Interventions: We conducted a single-center, open-label, randomized controlled trial comparing a 3D

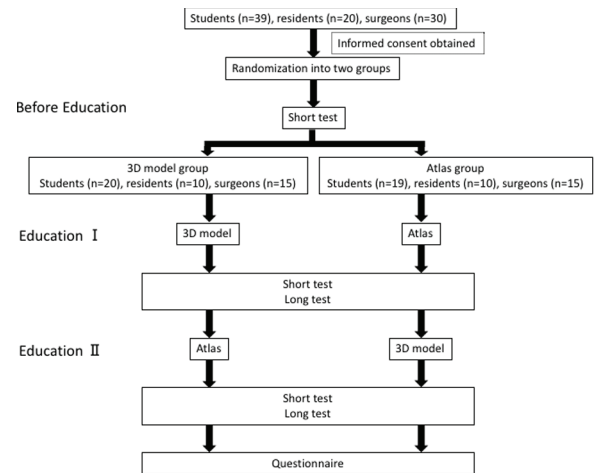
LT15 Results of National Survey Defining Anastomotic Leak

Scenarios	% (N=649)
SCENARIOS REPRESENTED AS ANASTOMOTIC LEAK BY MAJORITY	
Imaging demonstrates extravasation of contrast outside the intestinal lumen at the anastomosis in an asymptomatic patient requiring no intervention.	
Strongly Agree	40.7%
Agree	49.9%
Neutral	3.6%
Disagree	4.5%
Strongly Disagree	1.3%
Imaging demonstrates extravasation of contrast outside the intestinal lumen at the anastomosis in an asymptomatic patient requiring percutaneous drainage.	
Strongly Agree	65.7%
Agree	32.6%
Neutral	0%
Disagree	0%
Strongly Disagree	1.7%
Imaging demonstrates extravasation of contrast outside the intestinal lumen at the anastomosis in an asymptomatic patient requiring re-laparotomy.	
Strongly Agree	77.9%
Agree	20.6%
Neutral	0.2%
Disagree	0%
Strongly Disagree	1.3%
Imaging demonstrates extravasation of contrast outside of intestinal lumen at the anastomosis at postoperative day 35.	
Strongly Agree	30.0%
Agree	55.8%
Neutral	8.2%
Disagree	4.7%
Strongly Disagree	1.3%
Postoperative patient with generalized peritonitis and fecal matter from wound.	
Strongly Agree	43.3%
Agree	35.1%
Neutral	11.1%
Disagree	8.4%
Strongly Disagree	2.4%
Postoperative patient with localized peritonitis requiring re-exploration showing intense inflammatory reaction and free fluid near the anastomosis.	
Strongly Agree	19.8%
Agree	49.0%
Neutral	21.1%
Disagree	9.5%
Strongly Disagree	0.7%
Intra-abdominal abscess close to the anastomosis in postoperative patient with fevers and tachycardia.	
Strongly Agree	28.8%
Agree	36.9%
Neutral	18.9%
Disagree	14.0%
Strongly Disagree	1.5%
SCENARIOS NOT REPRESENTED AS ANASTOMOTIC LEAK BY MAJORITY	
Intra-abdominal abscess close to the anastomosis in an asymptomatic postoperative patient.	
Strongly Agree	11.9%
Agree	38.2%
Neutral	23.7%
Disagree	23.5%
Strongly Disagree	2.8%
Imaging showing air-bubbles around anastomosis in postoperative patient.	
Strongly Agree	10.7%
Agree	37.3%
Neutral	30.3%
Disagree	20.2%
Strongly Disagree	1.5%
CT with IV/PO contrast is always necessary to diagnose an anastomotic leak.	
Strongly Agree	2.6%
Agree	11.8%
Neutral	12.9%
Disagree	55.0%
Strongly Disagree	17.8%

printed model with an atlas as tools to promote anatomical education. From July to September 2018, a total of 39 medical students, 20 residents, and 30 young surgeons were enrolled in the present study. They were randomly assigned to the 3D model group or the atlas group. First, they completed a short test to confirm their basic knowledge before further education. After collocated education (education I), they completed the same short test again and another long test to evaluate their learning outcomes. Next, after the education tool was exchanged, they completed their education using atlas for 3D model group and using 3D model for atlas group (education II) and completed the same short test and long test again. Finally, they completed a questionnaire about their satisfaction with their education.

Results/Outcome(s): The 3D model group comprised 20 students, 10 residents, and 15 surgeons. After education I, the long test scores of the 3D model group were significantly higher than those of the atlas group in students ($p=0.01$), residents ($p<0.001$), and surgeons ($p<0.001$). Similarly, the short test scores of the 3D model group after education I were significantly higher than those of the atlas group for students ($p=0.03$), residents ($p=0.05$), and surgeons ($p=0.002$). Final scores of the short and long tests after education II were similar for the 3D model and atlas groups. The atlas group (which was educated using the 3D model after being educated using the atlas) had significantly higher long test increment scores than the 3D model group (which was educated using the atlas after being educated with the 3D model) after education II in students ($p=0.03$), residents ($p=0.05$), and surgeons ($p=0.002$). Regarding the questionnaire, the positive feedback rate (4=agree and 5=strongly agree) exceeded 60%. The rate of positive student feedback was lower than those of residents and surgeons. In particular, the anatomical enjoyment question (3D model aroused my interests in anatomy) scores indicated by students were significantly lower than those indicated by surgeons (ANOVA: $p=0.03$; post-hoc: $p=0.01$). Furthermore, scores for the attitude question (the 3D model is the best material for anatomical education) indicated by students were significantly lower than those indicated by residents (post hoc: $p=0.02$) and surgeons (post hoc: $p=0.003$; ANOVA: $p=0.006$).

Conclusions/Discussion: Education using a pelvic model is superior to that using an atlas when learning pelvic anatomy required for LLND.



INTERSTIM PERIPHERAL NERVE EVALUATION (PNE) FOR FECAL INCONTINENCE: HIGH-FIDELITY TESTING FOR FECAL INCONTINENCE.

M1

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Purpose/Background: Sacral neuromodulation is an emerging technology that has been endorsed as a minimally invasive method for the treatment of fecal incontinence. It has offered significant and durable improvement when compared to traditional methods (sphincteroplasty, bulking agents, and injectables). The procedure is adaptable to the office setting, outpatient setting, and has a very limited and relatively benign set of complications prompting exceedingly rapid and widespread adoption for colorectal surgeons. One of these advantages is the presence of an incorporated screening test. However, many colorectal surgeons utilize the staged approach of screening, rather than the peripheral nerve evaluation (PNE) test. PNE vs. staged testing has been reviewed previously in the neurology literature, but only for predictive value rather than efficacy, and these studies lacked equipoise in comparisons of the screening modalities. PNE is done under a local anesthetic with temporary electrodes which are removed at slightly less than a week. These wires are not leads (which are much more costly), and they have no fixation (no tines). Many reports note that they are much more prone to slippage and can be ineffective screening methods, particularly when surgeons are learning the procedure. Further, PNE screening utilizes the placement of bilateral temporary electrodes, which can lengthen a difficult case of placement. However, the PNE screening is much less costly, offers a “sidedness” of evaluation, can be done under a local anesthetic, and it is far easier to reverse (the electrodes slide out easily in the office). Additionally, PNE can be performed in an office setting, and when performed in an outpatient setting, operating times are historically

markedly shorter, thus reducing OR cost substantially. We studied the conversion rate of patients undergoing PNE screening vs. those historically treated by staged screening to final implantation to evaluate the efficacy of PNE.

Methods/Interventions: We studied a single surgeon's experience over one year with PNE screening utilized after experience with staged screening and lead placement. 50 sequential patients with a variety of etiologies of fecal incontinence underwent peripheral nerve evaluation with bilateral temporary electrode placement, secured only by coiling the temporary wires under Tegaderm.

Results/Outcome(s): 50 out of 50 patients had results far in excess of "greater than 50% reduction in incontinence episodes" with 38 having "complete" continence. 49 out of 50 patients underwent full implantation. Historical conversion to full implantation is in excess of 80%. Average insertion time for both temporary electrodes and case completion was an average of 12 minutes.

Conclusions/Discussion: Peripheral nerve evaluation is a simpler but efficacious method of screening patients who may benefit from sacral neuromodulation that is readily reversible should the patient not benefit as well as time/cost effective.

BOTULINUM TOXIN VERSUS ELECTROGALVANIC STIMULATION FOR LEVATOR ANI SYNDROME: IS ONE A MORE EFFECTIVE THERAPY?

M2

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Purpose/Background: Levator ani syndrome is a symptom complex of severe pain and pressure in the anorectal area which can be difficult to manage and treat. At our institute patients who are refractory to medical management are offered either electrogalvanic stimulation (EGS) or Botulinum toxin A (BTX) injection. The data on long term outcomes for these treatments is lacking. We therefore aimed to compare the long term effectiveness of these interventions for symptoms of Levator ani syndrome in our patient cohort.

Methods/Interventions: Patients were identified from a prospectively collected IRB approved database. Data points for analysis included demographics including gender, age and type of treatment received, frequency & dose (EGS volts / BTX units / steroid milligrams), previous perianal surgery & clinical follow up in months. Patients were also contacted to determine response to treatment (complete, partial or none), short term benefit (<3 months) & long term benefit (>12 months) of treatment.

Results/Outcome(s): Over a six year period there were 109 (73 female) patients treated at our institute for medically refractory Levator ani syndrome with BTX or EGS. Medically refractory Levator ani syndrome was defined as a patient who failed to respond to medications including cyclobenzaprine, diazepam, chlorthalidone & albuterol.

One hundred and four patients received BTX & 18 patients had EGS. Thirteen patients received both EGS & BTX. Sixty two patients received steroid injection concurrently with BTX (65% had 40mg, 34% 80mg & 1% 120mg). Median age was 52 years. The median number of treatments was one for BTX (1-8 SD 1.5) with 79% receiving 200 units, 19% 100 units & 2% 50 units. The median treatment number for EGS was 3 (2-81, SD 19) with a median maximum tolerated voltage of 300 (200-450, SD 72.6). Of the patients who had both BTX & EGS; ten had EGS first & five had BTX first. Thirty seven patients had previous perianal surgery. The most frequent procedures were fistulotomy (n=7), stapled haemorrhoidectomy (n=5), lateral internal sphincterotomy (n=5) & open haemorrhoidectomy (n=5). There was no association found between previous surgery & response to treatment (p=0.12). Twenty seven patients had a concurrent diagnosis of obstructive defecation syndrome (ODS). ODS was more commonly associated with Botox treatment (p=0.04). The median clinical follow up in the office was three months (0-72, SD 14). On phone follow up 36.2% reported a complete resolution of their symptoms with BTX, 19.8% reported a partial resolution & 44% reported no resolution. In the patients who had EGS 29% reported a complete resolution of their symptoms, 14% a partial resolution & 57% no resolution. There was no difference between the two groups (p=0.6) in terms of response reported to treatment. Of those patients who had EGS first 20% reported a short term benefit to EGS & 70% reported a short term benefit with BTX. Of the five patients who had BTX first & then had EGS they reported no response to either treatments. There was no difference found in response to treatment between those who received steroid & those who didn't (p=0.8). We found that patients who had BTX were more likely to report a short term benefit (<3 months) when compared to the EGS group (70.6% vs 21%, p <0.001). This difference did not sustain in the long term (>12 months) (14.13% Botox vs 8% EGS, p=0.1).

Conclusions/Discussion: Both BTX & EGS are to some extent effective at resolving symptoms of Levator ani syndrome. In the short term BTX appears to be more effective. Neither treatments sustain their benefit in the long term. This underlines the complexity facing the treating physician when managing Levator ani syndrome.

PATIENTS' PATHWAY IN A TERTIARY REFERRAL PELVIC FLOOR UNIT.

M3

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Purpose/Background: Colorectal pelvic floor dysfunction is known to have a high incidence, especially in the female population. There is increasing awareness of these conditions amongst patients than consequently

raises pressure on the pelvic floor services. Conservative management, usually referred to as biofeedback, should be considered first line treatment as it is known to improve symptoms in approximately 70% of patients. Therefore, only a proportion of patients will need investigations and/or surgical intervention. In order to meet the increasing demands for colorectal pelvic floor services, a dedicated telephone triage assessment clinic was set up to establish a more efficient pathway to get the appropriate investigations and treatment, as well as reducing waiting times and patient's visit to hospital. The aim of this study is to review the pathway from a telephone triage assessment clinic (TTAC) in patients suffering from pelvic floor dysfunction.

Methods/Interventions: From March 2013 until January 2017 referrals to our Pelvic Floor Unit were assessed for their suitability for TTAC. Appropriate patients were evaluated with standardised symptom questionnaires that would identify red flag, defaecatory difficulties, faecal incontinence, pelvic organ prolapse and urinary symptoms to direct them into a specific pathway. The TTAC was performed by a specialised colorectal clinical nurse or clinical scientist with consultant supervision. Depending on the symptoms and severity, a decision was made whether the patient would benefit from further investigations, conservative management, consultant clinic or referral to another specialist service. Included in the conservative treatment or biofeedback, there are a cluster of strategies that include advice on correct toilet positioning and dynamics, pelvic floor exercises, dietary changes, pharmacological treatment, anal plugs, rectal suppositories and transanal irrigation with low and high volume. All patients were virtually reviewed in a multidisciplinary meeting (MDM) with consultant colorectal surgeons, colorectal clinical nurse specialists, clinical scientists, specialist physiotherapists and clinical and research fellows. The best treatment strategy for each individual patient was decided and documented. Those patients with structural abnormalities suitable for surgery were advised to optimise their bowel function through biofeedback prior to a surgical intervention which was agreed by at least two consultants during the MDM. Patients identified as having multiple pelvic floor compartment symptoms were discussed in a joint MDM with participation also of consultant urogynaecologists and urologists. After any surgery, patients were followed up in the biofeedback clinic to consolidate correct defaecatory strategies to try to enhance the surgical outcomes and minimise the risk of symptoms recurrence. In order to guarantee an easy access to a clinic, patients were allowed to book a follow up appointment for 12 months after the surgery without the need for further referrals.

Results/Outcome(s): 1445 patients' referrals from primary and secondary care centres were suitable for TTAC, from which 1323 attended the telephone consultation. Median waiting time for TTAC was 35 days. The main symptoms were constipation (47%), incontinence

(36%) and mixed constipation + incontinence (9%). Straight from TTAC, 88% of patients had diagnostic tests (89% in 2013, 68% in 2016), 8% started biofeedback (none in 2013, 19% in 2016), 3% were reviewed in a surgical clinic, 1% were referred to a different specialist. In terms of diagnostic tests, 86% had dynamic pelvic floor ultrasound, endoanal ultrasound and anorectal manometry, 76% had defaecating proctogram, 9% had urodynamics. In total, 1105 patients had biofeedback (76%) with a median of 3 sessions per patient, and only 10% needed surgical intervention. 69% of patients didn't need a surgical clinic appointment throughout their journey. For those who required surgery, 34% had transvaginal rectocele repair, 25% had laparoscopic ventral mesh rectopexy, 21% had a proctological procedure, 6% had a Delorme's, 2% had sphincter repair, 2% had sacral nerve neuromodulation, 1% had bulking agents, 1% had a subtotal colectomy, 1% had posterior mesh rectopexy and 7% had other procedures. There were 15% joint procedures with urogynaecology or urology.

Conclusions/Discussion: In order to optimise resources and improve patient's satisfaction, an adequate triage system allowed us to improve the pathway for each individual patient with pelvic floor dysfunction according to their symptoms and/or tests results. From the results of this study, we have more evidence to defer any possible investigations until after biofeedback. With further analysis we could decide which group of patients would benefit from the specialists tests and only perform them in those selected patients.

MAKING AN IMPACT THROUGH MULTIDISCIPLINARY CONSENSUS: A REPORT FROM THE PELVIC FLOOR DISORDERS CONSORTIUM.

M4

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Purpose/Background: Pelvic floor (PF) disorders are frequently multicompartamental, with patients suffering from interrelated bowel, bladder and sexual dysfunction, which impacts patient quality of life. Multiple validated tools exist in the literature to measure these complaints and each subspecialty tends to use their "favorite" tools. This lack of consensus hinders comparison of data and hinders comparison of results in meta-analyses. The goal of this effort was to reach consensus on which of the existing validated instruments should be recommended to be used as baseline measurement tools. The goal was to create a common baseline measure that could then allow communication across subspecialty silos, encourage referrals for treatment of coexisting pathology and facilitate multidisciplinary research.

Methods/Interventions: The study involved a three step Delphi process: a technique that employs an iterative consensus making in which summaries of the responses are fed back to the group after each round. In the first round, 6 multidisciplinary work groups evaluated the currently available validated tools used to measure severity of fecal incontinence (FI), constipation (C), lower urinary tract symptoms (LUTS), sexual function in males (SFM) and females (SFF). Workgroups performed a thorough literature review to identify and characterize the existing tools based on validity, reliability, sensitivity to change, rate of use in the literature, and ease of use. In round 2, the work groups critically evaluated the data collected during round 1 to reach consensus (>70% agreement) on the top 3 tools for FI, C, LUTS, SFM and SFF. These tools were recommended for further consideration and in person discussion during the PF consortium expert panel. The top 3 tools were advanced to the consortium meeting if the panel reached a consensus (> 70 % agreement) that the tools needed to be considered for inclusion into the final recommended panel of tools. The third round consisted of an in person PF consortium meeting where the tools were discussed and selected for ultimate inclusion into the combined “Initial Measurement of Pelvic Floor Complaints Tool” (IMPACT).

Results/Outcome(s): 110 clinical experts representing the subspecialties of colorectal surgery, urogynecology, urology, physiotherapy and gastroenterology convened in person for a one day expert consensus review of the top 3 tools proposed by the work groups in each of the 6 conditions. Significant consensus was reached on numerous topics of discussion, including agreement on the total number of questions that would allow for routine use of an instrument (less than 45, consensus 98%); agreement that pulling relevant domains out of larger tools is acceptable if domains were separately validated (97% consensus); agreement that the final tool must not repeat the same question multiple times if possible (96% consensus) and must include a measure of all PF complaints discussed. The panel also reached consensus on which tools to include into the final IMPACT (FI: 95% consensus; UI: 98% consensus; C: 87% consensus; SFM: (98% consensus) ; CFW: (91% consensus). Guided by the expert panel consensus recommendations the PF consortium working groups created the final combined IMPACT document.

Conclusions/Discussion: Consensus has been reached on which PF tools should be used in a routine clinical setting and as a baseline measure in clinical research addressing common PF symptoms. These tools can be augmented with quality of life tools and more robust measurement tools when detailed information about a condition is needed to fine-tune decision making.

IMPACT: Bowel Function Assessment Tool

Name: _____ DOB: _____

Directions: These questions will ask you if you have certain bowel symptoms and, if you do, how much they bother you. While answering, please consider your symptoms over the last 3 months.
Please think about your typical bowel movements.

① Please choose which stool type is most like the shape of your stools!

Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Separate, hard lumps like nuts (hard to pass)	Sausage-shaped but lumpy	Like a sausage, but with cracks on the surface	Like a sausage or snake, smooth and soft	Soft blobs with clear-cut edges	Fluffy pieces with ragged edges, a mushy stool	Watery, no solid pieces, entirely liquid

② During a typical month, how many times do you usually have a bowel movement?

Daily	A few times per week	Once per week	Once every 2 weeks	Once a month
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

③ Are you having difficulty with having infrequent bowel movements (less than 1 bowel movement every 3 days)?

Frequency		Severity		Impact
How often do you experience infrequent bowel movements?		How severe is this symptom for you?		How much does this symptom bother you?
<input type="checkbox"/> Occasionally experience this	<input type="checkbox"/> Usually experience this	<input type="checkbox"/> Not at all severe (I go almost every day)	<input type="checkbox"/> Mild	<input type="checkbox"/> Not at all bothersome
<input type="checkbox"/> Sometimes experience this	<input type="checkbox"/> Usually experience this	<input type="checkbox"/> Somewhat severe (I go 1-2 times per week)	<input type="checkbox"/> Severe	<input type="checkbox"/> A little bothersome
<input type="checkbox"/> Always experience this	<input type="checkbox"/> Always experience this	<input type="checkbox"/> Extremely severe (I can go up to 4 weeks without going)	<input type="checkbox"/> Extremely severe	<input type="checkbox"/> Somewhat bothersome
				<input type="checkbox"/> Very bothersome
				<input type="checkbox"/> Extremely bothersome

IMPACT consensus document preliminary example

A COMPREHENSIVE ANALYSIS OF BOWEL FUNCTION AFTER J-POUCH FOR ULCERATIVE COLITIS: ARE WE MISSING THE FOREST FOR THE TREES?

M5

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Purpose/Background: Functional outcomes following ileal pouch anal anastomosis (IPAA) and J-pouch for ulcerative colitis (UC) have been studied, however the field lacks standardization in the reporting of functional measures, with the literature being mostly focused on fecal incontinence (FI) and frequency of bowel movements. Furthermore, the selection of bowel function symptoms to study has been a paternalistic process, centered on symptoms believed to be important by surgeons and lacking input from patients themselves. In contrast, many studies of patients with “Low Anterior Resection Syndrome” (LARS) after proctectomy for rectal cancer have demonstrated a myriad of additional bowel dysfunction symptoms that present after resection of the rectum. Since UC patients undergo both proctectomy and total colectomy, their bowel symptoms are likely to be more severe. However, a complete understanding of which additional bowel symptoms are present in this patient population is lacking, representing an essential gap in our knowledge that should be filled to better inform patients and manage expectations for outcomes after surgery. The aim of this study was to therefore utilize validated bowel function patient surveys to determine which bowel symptoms are present in J pouch patients and whether or not these patients display a functional profile similar to patients with LARS.

Methods/Interventions: Adult ulcerative colitis patients that underwent restorative proctocolectomy with J pouch creation and had restoration of intestinal continuity at a single colorectal surgery center were prospectively recruited. Bowel function was assessed at least 12

weeks after ileostomy reversal utilizing the Memorial Sloan Kettering Cancer Center Bowel Function Instrument (MSKCC BFI). The MSKCC BFI was designed to measure bowel function after sphincter-preserving surgery for rectal cancer and includes several items focusing on LARS symptoms, such as fragmentation, clustering, urgency, and dietary changes. It's accuracy in evaluating bowel function has been confirmed through stringent validation. Patients were additionally asked general quality of life questions and clinical data on demographics, comorbidities and surgical details were collected. Calculated scores were compared to historical scores from the patient cohort undergoing sphincter sparing surgery for rectal cancer in the original MSKCC BFI validation (n=127). In this cohort, 38% had a colon-anal resection, 65% received radiation, and bowel function was generally thought to be significantly altered compared to baseline.

Results/Outcome(s): Surveys were sent to 350 J pouch patients with 159 (45%) responses. The median time after ileostomy reversal for survey completion was 21.5 months (IQR 12.2 – 39.5). The median age was 37 years (IQR 25-48), and 87 (55%) patients were male. The majority of patients had a two or three stage procedure (71.3% and 19.8% respectively) and the anastomotic leak rate was 10%. The mean total MSKCC BFI score for the cohort was 59.9+/-9.7 compared to a reported average score of 63.7+/-11.6 for LAR patients (p<0.01), indicating worse bowel function in J pouch patients. When evaluating the MSKCC BFI subscales, J pouch patients reported a frequency subscale score of 18.2+/-3.8, a median diet score of 12.2+/-3.8, and a median urgency score of 15.9+/-3.7 compared to 21.7+/-4.5 (p<.001), 14.1+/-3.7 (p<0.001), and 15.0+/-3.9 (p=0.04) respectively for LAR patients in the literature. Furthermore, J pouch patients reported a median score of 3-sometimes (IQR 3-4) on an incomplete bowel emptying item, a median score of 3-sometimes (IQR 3-4) on a clustering item, a median score of 3.5-sometimes to most of the time (IQR 3-4) for differentiating between stool and gas, and a median score of 4-most of the time (IQR 3-4) for ability to control passage of gas.

Conclusions/Discussion: Patients that undergo IPAA with J pouch exhibit a constellation of bowel function symptoms that is more complex than fecal incontinence and frequency alone, despite the focus on these functional outcomes in the literature. Analyzing this cohort with the MSKCC BFI indicates likely worse overall bowel function and worse frequency, urgency, and diet subscale scores

compared to rectal cancer patients that undergo LAR. Additionally, J pouch patients experience clustering, fragmentation, and obstructed/incomplete evacuation; these symptoms have not been previously reported or studied in J pouch patients, but are clearly an important component of their overall bowel function. This amalgamation of bowel function symptoms is analogous to LARS, and may represent a previously undescribed "Ileoanal J-pouch Syndrome." Furthermore, this study highlights the similarity of rates of these symptoms with LAR patients and the need for recognition, definition, score development, monitoring and treatment of symptoms that patients perceive to most affect quality of life.

SACRAL NEUROMODULATION DEVICE-RELATED COMPLICATIONS: A SINGLE CENTER EXPERIENCE.

M6

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Purpose/Background: In less than a decade, sacral neuromodulation (SNM) has become the first line surgical treatment for fecal incontinence in patients who have failed conservative therapies. The role of SNM in the treatment of constipation is being defined. As the indications for this technology broaden, potential complications should be delineated. Given the paucity of literature, the purpose of this study was to review the complication rate and need for reoperation in patients undergoing SNM implantation.

Methods/Interventions: A retrospective chart review was performed of patients who underwent a two-stage placement of SNM device at our institution between 2013 and 2018. All procedures were performed by the same surgeon. All data of perioperative and postoperative complications and their management were collected.

Results/Outcome(s): A total of 121 patients with fecal incontinence and/or constipation underwent a two-stage SNM device placement over the span of 5 years. Median follow up from implantation was nineteen months. Sixty-one patients (51%) had pelvic floor dysfunction related constipation while 60 patients (49%) had fecal incontinence. Age ranged from 20 years to 88 years of age, with a median age of 48. Overall complication rate was 17% (n=21), which included explantation of device, lead revision,

M6 SNM device complications in fecal incontinence and constipation groups

	Fecal Incontinence (n= 60)	Constipation (n= 61)
Complications	10 (47%)	11 (53%)
Lead revisions	4 (45%)	5 (55%)
Pocket revisions	2 (66%)	1 (34%)
Explantation	4 (50%)	4 (50%)

infection, and pocket revisions. Lead replacement for lead migration (n=10, 8.3%) was the most common complication, which presented as recurrence of pre-implantation symptoms at average 21.7 months post-implantation. A total of 8 devices were completely removed in 5 years, 75% were done for radiculopathy despite improvement in symptoms. Wound infection occurred in 4 patients (3.4%), with 2 devices requiring explantation. Only one patient required both lead revision and ultimate explantation for radiculopathy; likely due to a BMI of 16. An equal number of explantations and lead/pocket revisions were done in the fecal incontinence and constipation groups (Table 1).

Conclusions/Discussion: While SNM has been seen as potentially revolutionary in the treatment of pelvic floor dysfunction syndromes, it is not without risk. Patients need to be counselled appropriately about the need for possible complication and reoperation as part of ongoing SNM therapy.

LAPAROSCOPIC VENTRAL MESH RECTOPEXY. IS IT STILL A SAFE PROCEDURE?

M7

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Purpose/Background: Laparoscopic ventral mesh rectopexy (LVMR) had a peak in popularity in Europe due to the benefits of this minimally invasive approach and the improved outcomes in terms of symptom resolution and low recurrence rates for rectal prolapse. Although initially used mainly for high take-off full thickness external rectal prolapse (ERP), the indications have been expanded for obstructive defecation syndrome (ODS) including large rectoceles and high grade intra-rectal intussusception descending onto the anal canal. The use of a ventral mesh fixed to the anterior aspect of the distal rectum combines the correction of pelvic floor descent during defecation and reinforcement of the rectovaginal septum, leading to restoration of physiological rectum capacity and function. There has been increasing concerns regarding the use of mesh in pelvic surgery, leading to a fall in its use and a simultaneous increase in the auditing process for this procedure. The aim of this study is to audit our results for laparoscopic ventral mesh rectopexy in a tertiary pelvic floor referral centre.

Methods/Interventions: Retrospective review of LVMR cases operated from March 2011 until September 2018 by 2 pelvic floor surgeons on a recorded database created by The Pelvic Floor Society. All patients prior to surgery underwent conservative treatment to improve their defaecatory function. The results of their investigations were discussed in a multidisciplinary meeting (MDM) with consultant colorectal surgeons, colorectal clinical nurse specialists, clinical scientists, specialist physiotherapists, clinical and research fellows.

Results/Outcome(s): 157 patients (96% female, 4% male) had a LVMR during this period. Indications for surgery were ERP in 85%, ODS in 12% and other reasons

in 3%. 93% of patients were agreed for surgery during the MDM. The type of mesh used was 70% biologic, 29% synthetic and 1% not recorded. Median length of stay was 3 days. A total of 16 patients (10%) had complications, of which 8 patients had type I in the Clavien-Dindo classification, 5 patients had type 2 and 3 patients had type 3b complications. In the latter group, 1 of the reinterventions was due to a rectovaginal fistula related to a synthetic mesh erosion, given a mesh-related complication rate of 0.6%. There were 5 patients that developed recurrent ERP (4 had biologic mesh, 1 synthetic) and 6 patients developed chronic pain (4 synthetic mesh, 1 biologic, 1 not recorded).

Conclusions/Discussion: Improvements on evaluation and understanding of our current practice helps us to provide accurate information for patients. This allows patients to make an informed decision regarding benefits of surgery against the potential risks. One of the possible key for success is preoperative improvement of their defecatory function through conservative measures clustered in what is commonly referred to as biofeedback. Despite current controversies regarding use of mesh in pelvic floor surgery, this review shows it is a procedure with a good success rate and low morbidity. Mesh-complication rate that falls into the standard of 0-3,9% described in the literature. Longer term follow up is required and ongoing. Laparoscopic rectal mesh rectopexy is still a safe and valid option for the treatment for rectal prolapse and selected patients with obstructive defecation. It has a low risk of complications in hands of trained pelvic floor surgeons supported by a multidisciplinary team making sure the right procedure is performed for the right patient at the right time.

EFFICACY OF SACRAL NERVE STIMULATION FOR FECAL INCONTINENCE IS LIMITED BY INCONSISTENT LONG TERM MONITORING.

M8

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Purpose/Background: Fecal incontinence is a disabling condition that significantly impacts quality of life. In the United States, its prevalence ranges from 2% to 17% affecting both men and women. Conservative measures with bowel management, dietary modification, and pelvic floor physical therapy have at best a 50% success rate. Surgical therapies directed at anal sphincter reconstruction or strengthening have mixed long term success with potential high morbidity. Since FDA approval for treatment of fecal incontinence in 2011, sacral nerve stimulation (SNS) has become a popular treatment option in the United States. The purpose of this study was to review our experience with sacral nerve stimulator implantation to assess for long-term durability.

Methods/Interventions: A retrospective chart review was conducted on patients who underwent sacral nerve stimulator implantation in our single institution between

November 2011 and October 2018. Sacral nerve stimulator implantation was performed in staged fashion with a 7-14 day trial phase followed by permanent implantation if there was >50% improvement in incontinence episodes. Primary outcome was SNS failure rate, defined as either permanent removal of SNS or device turned off indefinitely due to lack of symptomatic improvement. Other measures included complications, revision or reimplantation, battery replacement time, and length of follow up. Comparisons were performed using unpaired student's t-test, $p < 0.05$ considered statistically significant.

Results/Outcome(s): A total of 129 patients (121 female, 8 male) underwent permanent sacral nerve stimulator implantation by five surgeons at our institution. Only one patient out of 130 failed trial sacral nerve stimulation and did not receive permanent implantation (99.2% successful trial phase). Long-term success was 77.5% as 29 patients were categorized as treatment failure after a mean follow up time of 27.6 months. Patients with SNS failure had a significantly lower improvement during the trial phase ($88.4 \pm 16.2\%$ vs $77.9 \pm 27\%$, $p = 0.018$). Thirteen patients (10%) underwent SNS revision or reimplantation due to device migration or infection. Twenty-nine patients (22.5%) experienced complications from the procedure including battery dislodgement, device malfunction, lead dislodgement, site pain, or infection. The average time to battery replacement was 45.7 ± 20.5 months ($n=15$). Nine patients (6.9%) had no follow-up since SNS implantation and 33 patients (25.5%) were past their expected battery life but failed follow-up in the previous 24 months.

Conclusions/Discussion: Despite a high success rate of trial sacral nerve stimulation, long term failure is at least 22.5% following permanent implantation. There is a correlation between efficacy of the trial phase and long term success. Furthermore, long-term failure may be even higher as 32.5% of patients had either no follow-up at all following SNS implantation or failed recent follow-up when their battery level should be low or expired. We concluded that sacral nerve stimulation remains an efficacious treatment for fecal incontinence in the short term, but long term success may be overestimated due to inconsistency of follow up in these patients.

EFFICACY OF ADIPOSE DERIVED STEM CELLS TO REDUCE RISK OF ANASTOMOTIC LEAK IN COLORECTAL SURGERY: A RAT MODEL.

M10

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Purpose/Background: Anastomotic leakage (AL) remains one of the most dreaded complications after colorectal surgery and anastomotic ischemia is a well-known risk factor for AL. Stem cell therapies have been

investigated as a novel therapy for a variety of ischemia-related disease states. This study investigated the use of adipose-derived stem cells (ASCs) on the healing of ischemic colonic anastomoses in a rat model.

Methods/Interventions: ASCs were isolated from the subcutaneous fat of human donors, and underwent multi-potency analysis with differentiation reagents. Forty eight male Wistar rats underwent laparotomy with partial distal colon resection and creation of an ischemic colorectal anastomosis by ligation of proximal and distal mesenteric vessels. The animals were divided into three groups: control group with an ischemic anastomosis ($n=16$), vehicle only group in which the ischemic anastomosis was treated with Gelfoam ($n=16$), and a treatment group treated with Gelfoam + ASCs ($n=16$). Animals were then sacrificed at POD3 or POD7. AL was assessed on necropsy as the finding of feculent peritonitis or peri-anastomotic abscess. Anastomotic bursting pressure (ABP) was measured at the time of necropsy, as well as the findings of abdominal adhesions and abdominal abscess. Adhesions and abscess were scored using previously described severity scores. Peri-anastomotic colon tissue was harvested for analysis. Rat mRNA expression was measured using quantitative real time PCR. Human ASC infiltration into the rat colon was analyzed using cross sections of anastomotic tissue stained for immunohistochemistry and identified with confocal microscopy.

Results/Outcome(s): The ASCs were shown to be multi-potent and successfully differentiated into known stem cell lineages of osteocytes, adipocytes, and endothelial cells. ASCs significantly decreased AL when compared to both vehicle control (Gelfoam only) and control at both POD3 (25% vs. 87.5% vs. 100%, $p < 0.01$) and POD7 (25% vs. 87.5% vs. 87.5%, $p < 0.01$). For abdominal abscess and adhesions, the mean scores for the ASC group at 3 days was 0.9 for abscess and 0.6 for adhesions compared to the control group score of 3.3 for abscess and 1.6 for adhesions and this was statistically significant for both findings ($p < 0.01$). ASC treatment had a 5.9-fold and 7.4-fold increased expression of rat VEGF when compared to control at 3 and 7 days respectively. ASC treatment also had a 25.1-fold and 2.4-fold increased expression of rat CD31 when compared to control at 3 and 7 days respectively. Tissue sections treated with CY3 conjugated anti-human nuclei antibody showed that the human ASCs successfully migrated from the Gelfoam vehicle into the rat colon submucosa at both 3 and 7 days.

Conclusions/Discussion: Locally-transplanted ASCs reduced anastomotic leak of ischemic colorectal anastomoses. ASCs should be a novel strategy for reducing the risk of AL in colorectal surgery.

16S rRNA TAXONOMIC ANALYSIS OF THE GUT MUCOSAL MICROBIOME AND ITS ASSOCIATION WITH THE DEVELOPMENT OF COMPLICATIONS FOLLOWING COLORECTAL SURGERY.

M11

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Purpose/Background: We are beginning to appreciate that the gut microbiome may play a role in not only the development of colorectal cancer but also the aetiopathogenesis of complications following colorectal surgery. We aimed to investigate the gut mucosal microbiome in a cohort of patients undergoing surgical resection for colorectal cancer. We hypothesised that the composition of the bacterial microbiome may be associated with the development of post-operative complications.

Methods/Interventions: In this prospective observational cohort study, consenting adult patients undergoing resection of colorectal cancer were included in the study. Perioperative care was according to a standardised enhanced recovery protocol. A gut mucosal sample was taken from the resection specimen approximately 10cm away from the tumour. Following initial DNA extraction from the mucosal sample, the V1-V2 section of the 16s rRNA gene was sequenced and used for taxonomic profiling. For comparisons of relative abundance of genera between patient cohorts, cohorts were first propensity matched on relevant factors (e.g. age, sex, bmi, smoking status, operation type and operative approach) to ensure balance between groups. Outcomes recorded included: anastomotic leak, intra-abdominal collection, post-operative ileus (POI), length of stay and mortality. POI was defined as either failure to pass stool by day 5 or insertion of a nasogastric tube for drainage.

Results/Outcome(s): Mucosal samples were obtained from 163 patients undergoing colorectal resection: 65 right hemicolectomies, 60 anterior resections, 14 sigmoid colectomies, 11 abdominoperineal resections, 8 left hemicolectomies and 5 other (subtotal and procto-colectomies). The median age was 70 years and the median length of stay was 8 days. Complications following the procedures included 6/163 (3.7%) anastomotic leaks, 14 (8.6%) intra-abdominal collections, 26 (16%) patients with post-operative ileus and 3 (1.8%) deaths. Neither Alpha (Shannon Index) nor beta diversity (Bray Curtis) were associated with pre-operative administration of mechanical bowel preparation (MBP). However, unsupervised principal coordinate analysis of taxonomic abundance revealed clustering of samples according to administration of MBP (figure). Supervised orthogonal partial least squares-discriminant analysis (OPLS-DA) then confirmed that MBP was associated with differences in bacterial community structure (R2X 0.15, Q2 0.31, pQ2=0.05). However, it was difficult to ascribe these changes to administration of MBP alone as there was significant confounding according to sample site. 83/93 (89%) of patients undergoing left-sided procedures received MBP compared to only 8/65 (12%) patients undergoing right hemicolectomy. OPLS-DA analysis could also separate samples by collection site (e.g. right vs. left, R2X 0.15, Q2 0.61, pQ2 = 0.05). Next we analysed taxonomic abundance according to peri-operative outcome to look for associations between specific taxa and complications. The abundance of *Streptococcus* spp. was significantly elevated in patients who went on to develop post-operative ileus (4 log fold increase, $p < 0.01$). *Enterococcus* (21 log fold increase, $p < 0.0001$), *Rothia* (20 log fold increase, $p < 0.0001$) and *Enterobacter* (20 log fold increase, $p < 0.0001$) genera were significantly increased and *Alloprevotella* spp. significantly decreased (23 log fold decrease, $p < 0.0001$) in patients who developed anastomotic leak. Overabundance of *Enterobacter* spp.

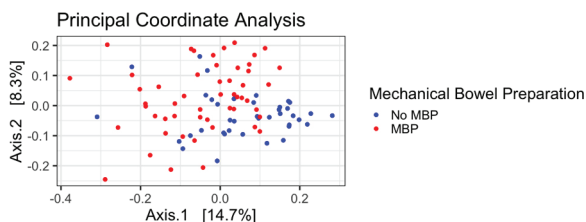
M10

	POD 3			
	Control (%)	Gelfoam (%)	ASC (%)	p value
Anastomotic Leak	8/8 (100)	7/8 (87.5)	2/8 (25)	$p < 0.01$
Anastomotic Bursting Pressure	41.3	35	75.6	$p = 0.08$
Abscess Score	3.3	3.9	0.9	$p < 0.01$
Adhesion Score	1.6	2.3	0.6	$p < 0.01$
	POD 7			
	Control (%)	Gelfoam (%)	ASC (%)	p value
Anastomotic Leak	7/8 (87.5%)	7/8 (87.5)	2/8 (25)	$p < 0.01$
Anastomotic Bursting Pressure	84.4	85.6	102.9	$p = 0.30$
Abscess Score	3.1	3.8	1.1	$p = 0.01$
Adhesion Score	2.0	2.9	1.5	$p = 0.21$

Table 1. Clinical Outcomes. Analysis performed using ANOVA, p values given compared to control.

was also significantly associated with the development of an intra-abdominal collection (22 log fold increase, $p < 0.0001$). Finally, length of stay greater than 8 days was associated with reduced abundance of *Fusobacterium* (2.6 log fold decrease, $p < 0.01$) and *Gemella* (5.12 log fold decrease, $p < 0.01$) genera.

Conclusions/Discussion: In this large observational study we have demonstrated significant changes in the community structure of the gut mucosal microbiome in association with pre-operative administration of MBP and/or sample site. We were unable to determine which is the main driving factor due to confounding between the two variables and this needs to be a focus of future investigation. Importantly, we have demonstrated significant changes in the relative abundances of specific bacterial genera in association with negative outcomes following colorectal surgery. The finding that *Enterococcus* is abundant in the perianastomotic mucosa of patients that go on to develop anastomotic leak is particularly interesting because it substantiates in a large human cohort findings from animal models. *Enterococcus* spp. have been shown to secrete collagenases which can degrade host collagen and active matrix metalloproteinases, contributing to anastomotic leak. Perioperative microbiome analysis may prove useful in predicting outcomes following colorectal surgery and developing our understanding of the underlying aetiopathogenesis.



COMMENSAL ENTEROCOCCUS FAECALIS COOPERATES WITH PLASMINOGEN FOR INDUCTION OF A MIGRATORY AND INVASIVE PHENOTYPE OF COLON CANCER CELLS.

M12

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Purpose/Background: Despite advances in surgical technique and adjuvant therapy, local and distant recurrence after colorectal cancer resection remains a formidable, yet poorly understood phenomenon. We have previously shown that the anastomotic site becomes colonized with highly collagenolytic *Enterococcus faecalis*, which have the ability to activate the host extracellular matrix components (ECM) and plasminogen; these products, in turn, are known drivers of tumor cell migration and invasion. How shed tumor cells, well-known to be present

in the lumen following colon resection, are influenced by this postoperative microenvironment to implant, migrate, and contribute to recurrence is unknown. We hypothesize that *E. faecalis* acts synergistically with plasminogen to enhance the migratory and invasive ability of colon cancer cells, representing a novel mechanism of colon cancer recurrence.

Methods/Interventions: Experiments were performed by co-incubating CT26 cancer cells with collagenolytic *E. faecalis* at a multiplicity of infection of 60, plasminogen at physiologic concentrations, or with both *E. faecalis* and plasminogen. After 48 hours of co-incubation, we used light microscopy to evaluate CT26 cells for changes consistent with development of a migratory phenotype such as tumor cell clumping and cell elongation. The migratory potential of CT26 influenced by the various conditions was assayed by analyzing the migration of CT26 across a transwell chamber for 24 hours. The invasive potential of CT26 cells was measured by layering transwell chambers with extra cellular matrix and measuring invasion of CT26 cells over 48 hours. Statistics were performed using fold increase measurements and paired simple *t*-test.

Results/Outcome(s): Both *E. faecalis* and plasminogen induced an elongated cell and clumping of CT26 tumor cells, consistent with acquisition of a migratory phenotype. Migration assay showed a significant increase in migration when CT26 cells were co-incubated with *E. faecalis* (1.6-fold, $p = 0.0001$) and plasminogen alone (1.5-fold, $p = 0.02$). Notably, plasminogen and *E. faecalis* were found to have an additive effect on CT26 cells migration (2.8-fold, $p = 0.01$). Invasive assays demonstrated a dramatic increase in invasion of CT26 cells by plasminogen, up to 8.0-fold, which was dramatically increased by the addition of *E. faecalis* to plasminogen up to 63-fold (Figure 1). *E. faecalis* alone was not able to induce robust changes in the invasiveness of CT26 cells.

Conclusions/Discussion: Plasminogen and collagenolytic *E. faecalis* synergistically induce migration and invasion of CT26 cancer cells *in vitro* representing a novel mechanism for colon cancer recurrence. Because these collagenolytic bacteria preferentially colonize anastomotic tissue, targeting these organisms and the plasminogen system may be a novel paradigm on how recurrence after curative resection is prevented.

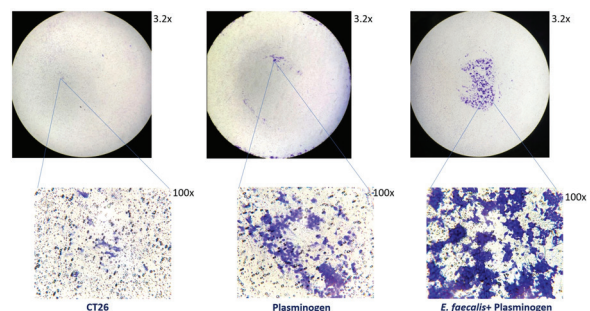


Figure 1: Invasion assay stained with crystal violet after 48 hours of incubation. CT26 cells demonstrate minimal invasion, addition of plasminogen demonstrates an 8-fold increase, while addition of collagenolytic *E. faecalis* and plasminogen dramatically induce invasion 63-fold.

AUTOPHAGIC INDUCTION PREVENTS ANAL CANCER WHEN THERE IS ALREADY ESTABLISHED LOW-GRADE DYSPLASIA.

M13

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Purpose/Background: Anal dysplasia and anal cancer are ever growing health problems. Current therapies for anal dysplasia are ineffective and not well-tolerated, resulting in high rates of disease recurrence. We have previously shown that PI3K/mTOR inhibition with LY3023414 (LY3) can prevent anal cancer development in an HPV mouse model of anal cancer through the induction of autophagy. This previous work examined the use of this systemic therapy in mice with starting normal histology. The purpose of the current study was to determine if systemic LY3 would be effective in mice with established anal dysplasia.

Methods/Interventions: *K14E6/E7* mice are mice that express HPV 16 oncogenes in their epithelium. When these mice are treated locally, at the anus, with a carcinogen they develop progressive anal dysplasia to carcinoma, as seen in humans. At 15 weeks of age greater 75% of *K14E6/E7* mice have low-grade dysplasia and 25% have high-grade dysplasia. For this study, mice were randomized to three treatment groups: no treatment, intra anal 7,12-Dimethylbenz[*a*]anthracene (DMBA), or DMBA with systemic LY3 (DMBA+LY3). LY3 was given by oral gavage 4.5mg/kg/daily. There were 13-14 mice per treatment group with equal distribution of males and females. Mice were in their respective treatment groups for 20 weeks. When treated with DMBA weekly, by the end of 20 weeks >95% of mice will develop overt anal cancer when treated with DMBA alone. The mice underwent weekly observations for anal tumor development. After 20 weeks into the study mice were euthanized and the anuses harvested and fixed. The anuses were then sectioned and underwent staining for autophagy, LC3b and p62. Groups were then compared in terms of tumor free survival, autophagic induction (LC3b) and autophagic function (p62) via immunofluorescence (IF). Tumor free survival was assessed using Kaplan Meier analysis, and differences in protein IF were assessed using ANOVA analysis with Tukey post-hoc testing.

Results/Outcome(s): Of the 14 mice that were not treated with DMBA, none of the mice developed tumors. Of the 14 mice treated with DMBA alone one mouse did not develop an overt anal cancer, and mean time to tumor development was 17.1 weeks. Of the 13 mice treated with DMBA + LY3 only 3 mice developed an anal tumor, which is statistically significant compared to those mice treated with DMBA alone (p -value<0.001) and comparable to control mice (p -value=0.61). Please refer to Figure 1 for tumor free survival. Looking at autophagic

induction, with LC3b expression on immunofluorescence, there was a statistically significant increase in LC3b expression in the mice treated with DMBA+LY3 compared to controls and DMBA alone treated mice (p -value= 0.030 and 0.043, respectively). In terms of autophagic function, there was a statistically significant increase in autophagic function, as measured by a decrease in p62 levels, in the DMBA and DMBA+LY3 mouse groups compared to controls (p -values =0.001 and <0.001, respectively).

Conclusions/Discussion: Autophagic induction, through systemic PI3K/mTOR inhibition, is effective in preventing anal cancer development in the setting of already established dysplasia.

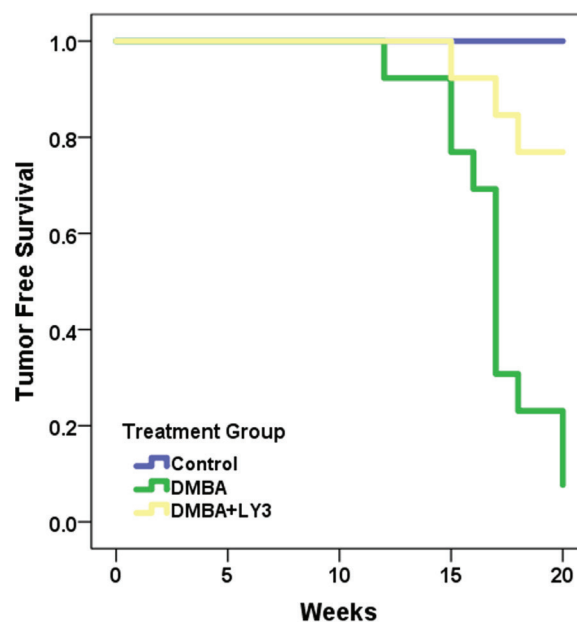


Figure 1: Tumor free survival in *K14E6/E7* mice with low-grade dysplasia.

BONE MARROW-DERIVED MESENCHYMAL STEM CELLS PROMOTE COLORECTAL CANCER PROGRESSION VIA CCR5.

M14

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Purpose/Background: The tumor-stromal interaction in the microenvironment promote tumor invasion and metastasis. Mesenchymal stem cells (MSCs) are pluripotent progenitor cells that contribute to the remodeling of injured tissues. In the context of cancer, recent studies propose that MSCs are recruited from the bone marrow to the stroma of developing tumors, where they serve comparable roles as critical components of tumor microenvironment. About the interaction between MSCs and cancer cells, various chemokines and cytokines have been reported to be involved. In this study, we investigated the interaction between colorectal cancer (CRC) cells and

bone marrow-derived MSCs, focusing on the chemokine signaling.

Methods/Interventions: To explore a candidate that functions between MSCs and CRC cells, conditioned media from the cultured human MSCs were screened using a chemokine array kit. We also assessed the expression of chemokine receptors by flow cytometry and quantitative RT-PCR. To investigate the interaction between MSCs and CRC cells, we performed both *in vitro* and *in vivo* assays. To evaluate the clinical relevance, 89 clinical CRC specimens and 114 preoperative serum samples were examined by immunohistochemistry (IHC) and ELISA, respectively.

Results/Outcome(s): A chemokine array indicated that several chemokines were produced by MSCs at a relatively high level, and, especially, CCL3, CCL4 and CCL5 were highly detected. Because the cognate receptor for these three chemokines was CCR5, we examined the expression of CCR5 in several CRC cell lines, and found that a relatively strong CCR5 expression could be detected within the cytoplasm. To investigate the role of CCR5 in CRC progression, we established stable HCT116 transfected lines in which CCR5 or empty vector was introduced by retroviral transfection (referred as HCT116-CCR5 or HCT116-EV cells, respectively). Regarding the CCR5-mediated cellular function *in vitro*, we found that CCL5 caused directional migration in HCT116-CCR5 cells, whereas it did not in HCT116-EV cells. Regarding the effect of CCR5 on the tumor growth *in vivo*, we inoculated HCT116-EV or HCT116-CCR5 cells (4×10^6 cells) into immunocompromised mice and found that there was no significant difference in size between the two cells. Next, to examine the effect of MSC mixture, we employed the co-inoculation mice model in which CRC cells (1×10^6 cells) were mixed with BM-derived MSCs (1×10^6 cells) and injected subcutaneously into immunocompromised mice. The size of the tumors in mice injected with HCT116-CCR5+MSCs was much larger compared to that in mice injected with HCT116-EV+MSCs. To additionally verify the roles of CCR5, we attempted to suppress tumor growth with a CCR5 inhibitor (maraviroc). Seven days after inoculation, we started to inject maraviroc (30 mg/kg/day) repeatedly into the mice, and then compared the effect to the control vehicle up to 3 weeks after inoculation. In the HCT116-EV+MSCs tumors, there was no significant difference in size between the two groups ($P = 0.37$). On the other hand, in the HCT116-CCR5+MSCs tumors, maraviroc significantly reduced tumor size ($P = 0.042$). IHC of clinical specimens revealed that 20 cases (29%) were high for CCR5, whereas 69 cases (71%) were low. There was no correlation of CCR5 expression with clinicopathological characteristics. To evaluate the effect of patients' prognosis, we analyzed the overall survival (OS), cancer-specific survival (CSS), and relapse-free survival (RFS). Statistical analyses indicated that stages 0-IV patients with CCR5-positive CRCs

tended to exhibit shorter OS and CSS than those with CCR5-negative CRCs ($P=0.08$ and 0.07 , respectively). Furthermore, we performed subgroup analyses based on the stage-based classification, and found that stage III/IV patients with CCR5-positive CRCs exhibited a significantly poorer prognosis (OS, CSS and RFS) than those with CCR5-negative CRCs ($P=0.001$, 0.009 and 0.035 , respectively). Furthermore, we investigated the effects of preoperative serum CCR5 ligands (i.e., CCL3, CCL4 and CCL5) on patients' prognosis. The cases with high CCL3 levels exhibited a significantly shorter OS and CSS compared to those with low CCL3 levels ($P = 0.02$ and 0.02 , respectively). The cases with high CCL4 levels exhibited a significantly shorter OS compared to those with low CCL4 levels ($P = 0.04$), and a similar correlation was also observed in CSS and RFS ($P = 0.06$ and 0.07 , respectively). On the other hand, there was no association between the CCL5 concentration and prognosis.

Conclusions/Discussion: These finding suggested that CCL3/4/5-CCR5 axis could facilitate tumor progression by the interaction between MSCs and CRC cells. The CCR5 inhibitor, maraviroc, was already clinically approved as a treatment for HIV-1 infection. a-CCR5 treatment could be an effective treatment strategy for CRC. Serum levels of CCL3 and CCL4 could be useful as biomarkers of CRC progression.

PROTEIN TYROSINE PHOSPHATASE RECEPTOR TYPE F: A NOVEL TARGET FOR COLORECTAL CANCER?

M15

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Purpose/Background: Colorectal cancer (CRC) is the second leading cause of cancer deaths in the United States. Targeted therapies in CRC have largely focused on tyrosine kinases, and little is known about the protein tyrosine phosphatases. In addition, Wnt pathway dysregulation is a substantial cause of CRC. Bioinformatic analysis reveals protein tyrosine phosphatase receptor type F (PTPRF) to be highly expressed in normal intestinal stem cells, however, its interaction with the Wnt signaling pathway is largely unknown. In this study, we investigated the functional role of PTPRF in regulating CRC cell proliferation and tumor growth and its interaction with the Wnt signaling pathway.

Methods/Interventions: Human CRC cell lines (HCT116 and patient derived xenograft Pt130) and *Apc*^{Min} mouse intestinal tumor organoids were used to generate PTPRF knockdowns (shPTPRF) through lentivirus directed RNA interference. Control cells were generated using a non-targeting lentivirus vector. The phenotypic and mechanistic effects of shPTPRF were evaluated. [1]

Crystal violet growth assay and Edu staining experiments were performed to evaluate the effect of shPTPRF on cell proliferation *in vitro*. [2] Wnt target gene expression was evaluated in shPTPRF cells through quantitative real-time PCR, western blotting, and Wnt reporter assays. [3] Tumor initiation potential was evaluated using colony formation assays in CRC cells and mouse organoids. [4] To determine the molecular mechanism by which PTPRF regulates Wnt signaling, a glycogen synthase kinase 3 (GSK3) inhibitor (CHIR99021) was used to fully activate Wnt signaling in knockdown cells. Biotinylation assays and immunofluorescence staining were used to identify the effect of PTPRF on regulating the endocytosis of the Wnt co-receptor, low-density lipoprotein receptor-related protein 6 (LRP6). The endocytosis inhibitors (Nystatin and Pitstop-2) were employed to evaluate the role of endocytosis as a regulating step of the Wnt signaling pathway. [5] Lastly, HCT116 shPTPRF and control cells were injected subcutaneously into immunodeficient mice to evaluate the effect of PTPRF knockdown on tumor growth *in vivo*.

Results/Outcome(s): [1] Knockdown of PTPRF significantly decreased cell proliferation ($p < 0.0001$, **Figure 1A**) as well as [2] the expression of Wnt target genes (Axin2, TCF7, cyclinD1) *in vitro* compared to control ($p < 0.0001$, **Figure 1B**). [3] Colony formation assays demonstrated knockdown of PTPRF significantly decreased the tumor initiation potential ($p < 0.0001$). [4] When treated with the GSK3 inhibitor, Wnt target gene expression in PTPRF knockdown cells was rescued demonstrating PTPRF functions upstream of the β -catenin destruction complex. Through the biotinylation assay and immunofluorescence staining, PTPRF co-localized with LRP6 in both the plasma membrane and intracellular vesicles suggesting its role in regulating the endocytosis of Wnt receptor complexes. Consistent with the notion that Wnt signaling relies on the endocytosis pathway, treatment with endocytosis inhibitors decreased the expression of Wnt target genes. [5] Lastly, shPTPRF cells had significantly decreased xenograft tumor growth *in vivo* compared to control ($p < 0.0001$, **Figure 1C**).

Conclusions/Discussion: Our studies identify PTPRF as a novel oncogenic protein by regulating Wnt activation through the endocytosis pathway. PTPRF suppression decreases CRC stem cell potential and reduces tumor growth. Thus, PTPRF may function as a potential target for future translational applications in CRC.

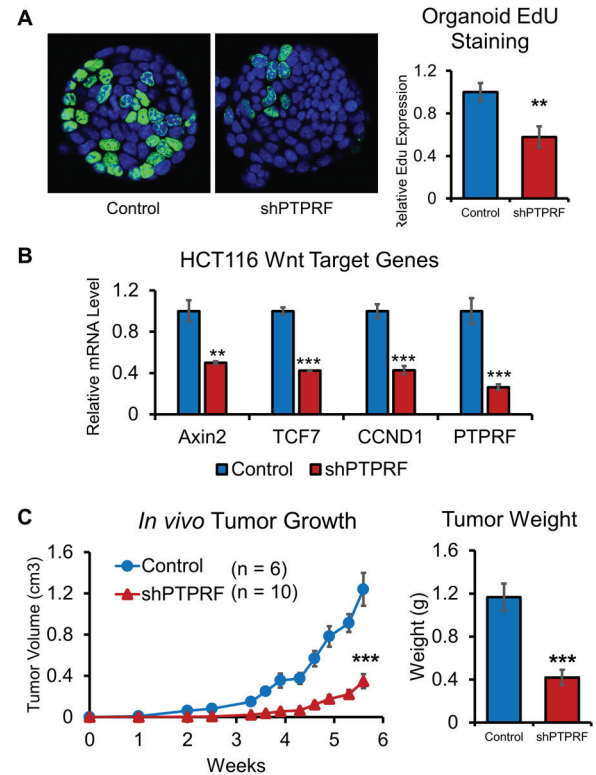


Figure 1. Knockdown of PTPRF inhibits cell proliferation and tumor growth by suppressing Wnt signaling in CRC. (A) Control and PTPRF knockdown *Apc*^{min} mouse intestinal tumor organoids were labeled with EdU. The number of EdU positive cells was decreased in PTPRF knockdown (shPTPRF) organoids indicating decreased cell proliferation. (B) The expression of Wnt target genes (including Axin2, TCF7, CCND1) was significantly decreased in shPTPRF HCT116 cells compared to control. (C) Knockdown of PTPRF decreased tumor growth *in vivo*. Control and shPTPRF HCT116 cells were injected subcutaneously into immunodeficient mice and the tumor volume and weight were found to be significantly decreased in the knockdown group. (** $p < 0.01$, *** $p < 0.001$).

CHANGES IN THE ENTERIC SEROTONIN SIGNALING SYSTEM FOLLOWING LOW ANTERIOR RESECTION.

M16

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Purpose/Background: Low anterior resection syndrome, characterized by frequency, urgency, clustering and incontinence of bowel movements, is common following rectal resection. The degree of low anterior resection syndrome is closely linked to post-operative quality of life. The exact etiology of low anterior resection syndrome is unknown. Some have postulated that alterations within the enteric nervous system may be to blame. When properly performing a total mesorectal excision for rectal cancer the mobilized descending colon and future neorectum is extrinsically denervated. The sympathetic innervation is interrupted following high ligation of the inferior mesenteric artery while parasympathetic innervation is

interrupted following pelvic mobilization. Animal models replicating this denervation have demonstrated changes within the serotonin signaling pathway of the enteric nervous system. We hypothesized that alterations in the serotonin signaling pathway of the enteric nervous system would occur following low anterior resection in humans and that these changes would be correlated to post-operative bowel function.

Methods/Interventions: Following Institutional Review Board approval ten patients with a diagnosis of rectal cancer were enrolled in the study from October of 2015 to September of 2017. All patients were candidates for low anterior resection with stapled anastomosis. Patients were administered the Memorial Sloan Kettering Bowel Function Index preoperatively and at each subsequent clinic visit. Four quadrant biopsies of the colon were obtained at the time of operation, loop ileostomy reversal and one year surveillance colonoscopy. The initial biopsies were obtained from the discarded proximal doughnut at the time of stapled anastomosis. Subsequent biopsies were taken just proximal to the anastomosis. All biopsies were taken with standard endoscopic biopsy forceps. Protein was isolated and Western blot analysis was carried out in duplicate for all specimens. Optical Densities for the Serotonin transporter (SERT), 5-HT₃ and 5-HT₄ receptors were measured. All samples were normalized to a B-Actin loading control. Average optical densities were compared using a one way ANOVA analysis to determine significance. Post-hoc Tukey HSD analysis was completed to determine significance between groups. The ratio of one year to preoperative protein concentration was calculated and compared to the difference between postoperative and preoperative bowel function indices.

Results/Outcome(s): Of the 10 patients initially consented, 6 were able to have all specimens successfully collected and analyzed. The average normalized optical densities for the 5-HT_{3a} receptor were 2.07, 0.35, and 0.94 ($p=0.002$) at time of resection, ileostomy reversal and 1 year time points respectively. For 5-HT₄ the average normalized optical densities were 1.56, 0.41, 0.74 ($p=0.03$) and 1.25, 0.09, 0.28 ($p<0.001$) for SERT at the same time points. A bowel function index decline of greater than points was seen in two patients. These two patients also had the highest ratio of post-operative to preoperative SERT optical densities, 0.3 and 0.5 while all other ratios were ≤ 0.2 .

Conclusions/Discussion: Following low anterior resection changes with the serotonin signaling pathway of the enteric nervous system do occur. A similar pattern of initial dramatic decrease followed by partial recovery occurred for all patients for all proteins assessed. Those with the largest recovery of the SERT protein demonstrated the worst post-operative bowel function. The Serotonin signaling pathway of the enteric nervous system could be a potential pharmacologic target for mitigating the symptoms of low anterior resection syndrome.

BONE MARROW MESENCHYMAL STEM CELL TRANSPLANTATION CAN PROMOTE THE REPAIR OF DAMAGED ANAL SPHINCTER STRUCTURE AND FUNCTION.

M17

X. Lid
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Purpose/Background: Bone marrow mesenchymal stem cells (BMSC) are widely used in wound repair due to their multi-directional differentiation potential, paracrine ability and low immunogenicity. Anal sphincter damage causes destruction of the structure and function of the sphincter leading to fecal incontinence. The purpose of this study was to evaluate the effect of BMSC on anal sphincter injury.

Methods/Interventions: Ninety-six virgin female Sprague-Dawley rats were randomly divided into four groups: intravenous (IV, $n=24$), intramuscular (IM, $n=24$), sham operation ($n=24$) and control ($n=24$). The first three groups have undergone a 25% sphincter complex resection, 10^6 green fluorescent protein-labeled BMSCs were suspended in 0.5 ml PBS, either iv or im into the anal sphincter from the day after sphincterotomy (SP) to one week. However, both the sham group and control group were injected with the same dose of PBS. Anal pressure and sphincter electromyography (EMG) were performed at 0, 3, 7, 14, and 28 days postoperatively, and histomorphometry was performed at 28 days postoperatively. Histomorphometry was performed after sacrifice of the rats.

Results/Outcome(s): At 14 days after surgery, all indicators in the treatment groups were significantly improved compared with the sham operation group ($P<0.05$). Compared with the IV group, BMSCs delivered IM resulted in a significant increase in peak pressure, as well as anal sphincter EMG amplitude and frequency 14 days after injury, but the resting anal sphincter pressure does not change until the 28th day ($P<0.05$). However, only the local injection group showed GFP-labeled fluorescent cells near the anal sphincter.

Conclusions/Discussion: BMSC treatment can significantly increase the anal sphincter pressure and anal sphincter EMG amplitude and frequency. Local injection of BMSC is more obvious, suggesting that local injection of BMSC can accelerate the repair of injured anal sphincters.

THE FACT INHIBITOR CBL0137 AUGMENTS RADIATION AND CHEMOTHERAPY IN RECTAL CANCER AND INHIBITS CANCER STEM CELLS.

M18

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Purpose/Background: The standard of care for locally advanced rectal cancer includes neoadjuvant chemoradiotherapy (nCRT) followed by surgical resection. Response to nCRT has been shown to be an important predictor of long-term survival. However, the response to treatment is highly variable with only 25% of patients achieving a complete pathologic response (pCR). Furthermore, cancer stem cells, a treatment resistant subpopulation of tumors, have been implicated in the development of local and distant recurrences, even in patients with minimal residual disease. The curaxin compound, CBL0137 (CBL), has been shown in preclinical studies to synergize with cytotoxic drugs by inhibition of the histone chaperone FACT (facilitates chromatin transcription), and thereby interferes with DNA repair mechanisms. We hypothesize that CBL0137 would increase the efficacy of nCRT by augmenting the effects of radiation and chemotherapy in rectal cancer cells and target cancer stem cells.

Methods/Interventions: Rectal cancer cells (HRT18, SW837) response to radiation was evaluated with clonogenic assays. Cells were seeded on 60 mm plates, at appropriate dilutions to form colonies in 1-2 weeks. Cells were treated with control medium or CBL overnight and then exposed to increasing dosages of gamma radiation. Colonies (> 50 cells) were counted 10 days following treatment. Radiation survival curves were constructed after normalization for the cytotoxicity induced by the drug alone. To assess the response to chemotherapeutic drugs, rectal cancer cells were plated at $1-3 \times 10^3$ cells/well in a 96-well plate in triplicate. After 24 h, the cells were treated with 5-FU, oxaliplatin, and/or CBL. Cell viability was evaluated 72 hours after drug treatment using CellTiter-Glo[®] 2.0 and normalized to DMSO controls. This was repeated in the primary colorectal cancer stem cell line E80.

Results/Outcome(s): CBL, as a single agent, inhibited colony formation and sensitized rectal cancer cells to radiation in a dose dependent fashion. The combination of 1 μ M CBL and 6 Gray of radiation led to near complete inhibition of colony formation. The dose enhancement factor (DEF; the ratio of IR dose to reduce survival to 10%) for CBL 1.0 μ M was ~ 1.9 (Figure 1A). CBL also inhibited the proliferation of rectal cancer cells and augmented the efficacy of 5-FU and oxaliplatin in a dose dependent fashion (Figure 1B). The primary colorectal cancer stem cell line E80 is relatively resistant to 5-FU ($IC_{50} = 4 \mu$ M) and oxaliplatin ($IC_{50} > 50 \mu$ M), but was effectively inhibited by CBL alone ($IC_{50} = 0.7 \mu$ M).

Conclusions/Discussion: CBL0137 inhibits rectal cancer cell growth and augments the effects of radiation and chemotherapy in rectal cancer cells *in vitro*. Furthermore, CBL0137 eradicates cancer stem cells that are resistant to conventional chemotherapy. These findings reveal a novel therapeutic regimen with the potential to augment neoadjuvant therapy and also target the stem cell population in rectal cancer.

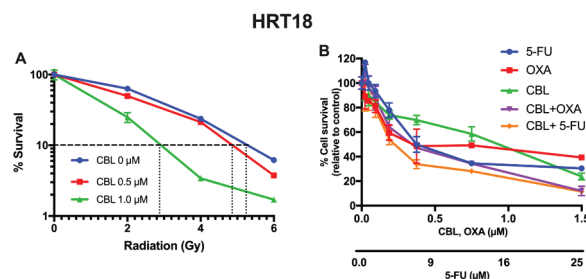


Figure 1: A) Treatment with CBL radiosensitizes rectal cancer cells. HRT18 cells were plated and treated overnight with 0, 0.5, or 1 μ M CBL. Fresh medium without drug was then added and cells were irradiated (0, 2, 4, 6 Gy). Colonies were counted after 10 days. B) CBL alone inhibits the growth of rectal cancer cells and augments the effects of 5-FU and oxaliplatin (OXA). HRT18 cells were plated at 1×10^3 cells/well in a 96-well plate in triplicate. After 24 h, the cells were treated with the indicated concentrations of 5-FU, oxaliplatin and/or CBL. Cell viability was evaluated after 72 h and normalized to DMSO controls.

REPRODUCIBILITY AND DIAGNOSTIC ACCURACY OF ENDOSCOPIC TUMOR RESPONSE ASSESSMENT AFTER NEOADJUVANT THERAPY FOR DISTAL RECTAL ADENOCARCINOMA: ON BEHALF OF THE OPRA TRIAL CONSORTIUM.

T1

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Purpose/Background: A “Watch and Wait” (WW) strategy may be safe in selected rectal cancer patients achieving a complete clinical response (cCR) following neoadjuvant radiation and chemotherapy, creating uncertainties regarding the added value of rectal resection. The reliable identification of patients potentially benefiting from a WW strategy, however, remains inadequate. Endoluminal examination is a critical diagnostic modality to determine the completeness of tumor response, yet, its reproducibility and diagnostic accuracy has not been studied systematically. This study was designed to examine pre-specified endoscopic criteria typically associated to varying degrees of tumor treatment response.

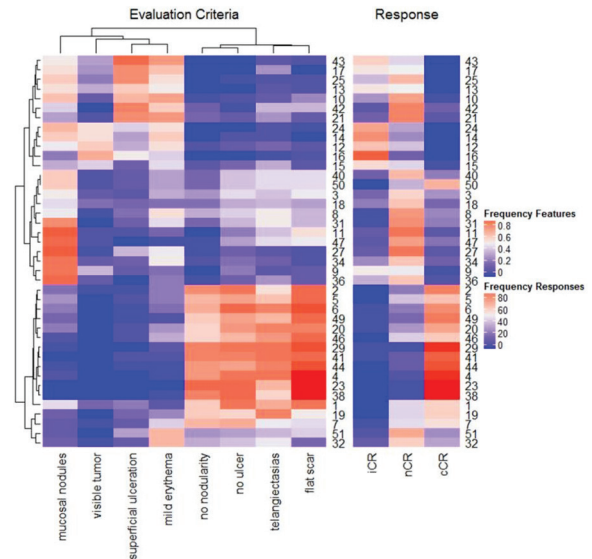
Methods/Interventions: Two distinct electronic questionnaires containing endoscopic photos of treated rectal tumors were distributed to colorectal surgeons. Neither questionnaire contained supplemental clinical information. In the first questionnaire, 37 colorectal surgeons evaluated 41 unique endoscopic photos of rectal tumors with variable

treatment responses to neoadjuvant therapy. Surgeons selected endoscopic features: 1) flat, white scar, 2) telangiectasia, 3) absence of ulceration, 4) absence of nodularity, 5) small mucosal nodules, 6) superficial ulceration, 7) mild persisting erythema of the scar, 8) visible tumor. Surgeons then assigned a clinical tumor response grade (cCR, near complete CR, or incomplete CR). The degree of observer agreement with each endoscopic feature and the assigned response grade was analyzed using a heatmap to visually illustrate inter-observer variability. A logistic regression model fitting endoscopic features and tumor response grade derived probabilities of assignment for each endoscopic feature and tumor response grade. In the second questionnaire, 23 surgeons evaluated the pre- and post-treatment endoscopic photos of 17 rectal cancers treated with neoadjuvant therapy. Tumor response grade assigned on the post-treatment photo was correlated to either the final pathology in patients who had surgery or sustained cCR (> 24 months with no local regrowth) in patients having WW. When nCR was chosen, surgeons were asked to select further treatment; immediate surgery or observation. Overall diagnostic accuracy was calculated for each surgeon across all photos for each grade of tumor response.

Results/Outcome(s): Study 1: Inter-observer agreement for endoscopic tumor response grade was highly variable, illustrated by color intensity within each cell of the heatmap. (Figure 1). However endoscopic features (flat white scar; telangiectasias; no ulceration; no nodularity) associated with cCR, while others (small mucosal nodules; superficial ulceration; persisting erythema; visible tumor) were associated with nCR/iCR. Three of the 8 endoscopic criteria (flat white scar; absence of ulceration; absence of nodularity) were statistically associated with assigning a complete tumor response. A flat white scar had the highest probability of assigning a cCR vs nCR/iCR (OR 3.92, $p < 0.0001$), and visible tumor the lowest probability of coding a cCR vs nCR/iCR (OR 0.08, $p < 0.0001$). When all four endoscopic features clustered within the cCR assignment were selected, the probability of assigning a cCR vs a nCR/iCR linearly increased to an OR 5.41, $p < 0.0001$. When 1, 2, 3, or 4 of the endoscopic features most frequently associated with a nCR/iCR were modeled, the OR of coding a cCR vs nCR/iCR was -4.19, -4.79, -5.32, -7.12, respectively ($p < 0.0001$). Telangiectasia was the only endoscopic feature not statistically associated with selection of a clinical response grade (OR 0.84, $p = 0.40$). **Study 2:** The average diagnostic accuracy across all surgeons and all tumor response grade responses was 73%; it was 89.2% (range, 78-100%) when surgeons assigned cCR; 69% (33-100%) when they assigned nCR and recommended WW, and 71% (range 29% to 100%) when they assigned iCR.

Conclusions/Discussion: Interpretation of endoscopic features used to assign clinical response grade to neoadjuvant therapy in rectal cancer vary significantly among surgeons, but they cluster consistently and correlate with a tumor response grade. While the overall diagnostic

accuracy in assessing clinical response was moderate, surgeons were better at identifying true responders than those with residual disease, particularly when the patient had a near complete response. This data may help refine the endoscopic criteria used to define clinical response and improve the selection of rectal cancer for WW.



Reproducibility of Endoscopic Feature Selection to Grade of Treatment Response

EXOPHYTIC CONDYLOMA: AS BENIGN AS WE THINK?

T2

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Purpose/Background: As the treatment of anal dysplasia continues to develop, there is still controversy regarding excisional versus destructive or topical treatment of these lesions. Some studies suggest that exophytic condylomas are lower risk lesions and more likely benign than flat lesions. This assumption may lead us to observe these lesions or fulgurate and not excise completely, which could leave dysplasia behind or undiagnosed. We aim to evaluate lesion type (flat versus exophytic) and its association to dysplasia.

Methods/Interventions: After obtaining IRB approval, we conducted a single center retrospective review of patients who underwent operative excision or biopsies of anal condyloma or dysplasia. A natural language search of the pathology database querying "anal squamous dysplasia" from 2005-2018 was performed. Pathology and operative reports were reviewed and two groups were defined based on lesion type: exophytic versus flat. Descriptive and statistical analyses were performed using a multiple nested mixed effects model comparing likelihood ratio tests to determine the relationship between lesion type and risk

factors for anal dysplasia and severity of dysplasia. All analyses were conducted in R 3.3.2.

Results/Outcome(s): 69 patients had a total of 423 lesions biopsied or excised. Mean age of the population was 48.2 (20-81); 62.3% were male and 46.4% of patients were black, 26 (37.7%) were white and 14.5% were Hispanic. Risk factors for anal dysplasia most frequently reported included HIV positivity in 47.8% of patients and men who have sex with men (MSM) in 39.1%. Other risk factors including cervical or vulvar cancer or dysplasia, transplantation, autoimmune diseases or steroid use were less common (4-8 patients/variable). 39.1% of patients had previous treatment for anal dysplasia. 55.3% of lesions were described as exophytic and 41.6% were flat (Table 1). Exophytic lesions were more likely to have higher grades of dysplasia (moderate, squamous cell carcinoma in situ (SCCIS) or squamous cell cancer) when compared to flat lesions. Flat lesions were more likely to have no or low grade dysplasia when compared to exophytic lesions ($p = 0.03$). In fact, exophytic lesions were about two and half times more likely to be associated with higher grade of dysplasia versus flat (OR = 2.63, 95% CI: 1.09 – 6.32). Lesion type was not associated with HPV-related changes, location, MSM, HIV status or the specialist who first identified the lesion. No significant relationship was found between grade of dysplasia and HIV status or MSM.

Conclusions/Discussion: This study is the first to examine gross appearance of a condylomatous or dysplastic lesions and the association with severity of dysplasia. Surprisingly, exophytic lesions were more than twice as likely to have higher grade dysplasia when compared to flat lesions. Risk factors such as HIV positivity and MSM were not associated with the type of lesion or the degree of dysplasia; thus, the only variable that predicted severity of dysplasia was gross appearance of the lesion. These findings do not support the assumption that flat lesions are higher risk than polypoid; thus, we should no longer underestimate the risk of dysplasia in these exophytic condylomas and plan our treatment strategies accordingly.

WHO SHOULD GET LATERAL PELVIC LYMPH NODE DISSECTION AFTER NEOADJUVANT CHEMORADIATION?

T3

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Purpose/Background: Despite the use of neoadjuvant chemoradiation (nCRT) and Total Mesorectal Excision (TME) for rectal cancer, lateral pelvic lymph node (LPLN) recurrence is still an important problem. This study aims to determine the indication for lateral pelvic lymph node dissection (LPLND) in post-nCRT rectal cancer.

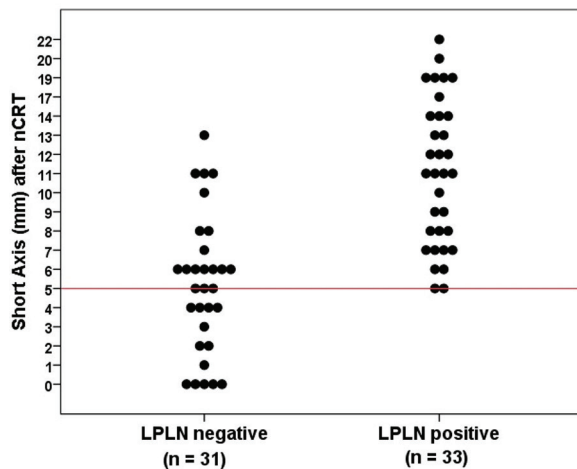
Methods/Interventions: Rectal cancer patients with suspected LPLN metastasis, based on imaging, who underwent TME with LPLND between 2006 and 2017 were identified from a prospectively collected institutional database; and the medical records were retrospectively reviewed for additional follow-up data. The associations between LPLN size on post-nCRT imaging and pathologic LPLN positivity and recurrence outcomes were evaluated.

Results/Outcome(s): A total of 64 patients were analyzed. The mean LPLN size before and after nCRT was 12.60 ± 9.51 mm and 8.5 ± 5.35 mm, respectively. The minimum size of positive LPLN was 5 mm on post-nCRT imaging. Among 13 (20.3%) patients who had < 5 mm LPLN after nCRT; none were pathologically positive. Among 51 (79.7%) patients who had ≥ 5 mm LPLN after nCRT; 33 patients (64.7%) were pathologically positive. 5 year OS and DSS were higher in histologic LPLN negative group than in LPLN positive group ([OS 79.6% vs 61.8%, $P = 0.122$], [DSS 84.5% vs 66.2%, $P = 0.088$]). After a median 39 months of follow-up, there were no patients in the < 5 mm group who died from cancer. There were no lateral compartment recurrences in the entire cohort.

Conclusions/Discussion: Post-CRT LPLN size ≥ 5 mm was strongly associated with pathologic positivity; moreover, no patients with size < 5 mm had pathologically positive lymph nodes. Patients with LPLN ≥ 5 mm after nCRT should undergo TME with LPLND.

T2 Gross Appearance of Condyloma and Severity of Dysplasia

	Total	Flat Lesion	Exophytic Lesion
Condyloma Type			
Flat	41.6% (176)	--	--
Exophytic	55.3% (234)	--	--
Other	2.6 (11)	--	--
Missing	0.5% (2)	--	--
Grade of Dysplasia			
No dysplasia	34.1% (140)	36.9 % (65)	32.1% (75)
Low grade dysplasia	21.7% (89)	23.3% (41)	20.5% (48)
Moderate dysplasia	3.7% (15)	2.8% (5)	4.3% (10)
SCC in situ	38.0% (156)	36.4% (64)	39.3% (92)
SCC	2.4% (10)	0.6 (1)	3.8% (9)



PREDICTION OF COLORECTAL CANCER RECURRENCE CAN BE IMPROVED USING AN ARTIFICIAL NEURAL NETWORK VERSUS STANDARD STATISTICAL METHOD: INITIAL INVESTIGATION USING CLINICAL DATA OF A SINGLE TERTIARY HOSPITAL.

T4

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Purpose/Background: Computer development and big data based deep learning have made several advances in solving many image processing and voice signal processing problems. Many businesses and hospitals are investing in deep learning to automate things that humans do. Individualized prediction of recurrence after surgery can help clinician to modify patients' treatment and provide patients detailed information. In this study, we aim to predict postoperative recurrence of patients who underwent curative resection for colorectal cancer based on deep-learning with a single tertiary hospital data.

Methods/Interventions: In the review of hospital data, there were 5777 patients who underwent curative resection of pathologic stage I – IV colorectal cancer between January 1996 and December 2015. Data included 39 variables, such as baseline characteristics (i.e. body mass index), serum tumor marker (CEA, CA19-9), operation record (i.e. operation time, surgeon, complication, estimated blood loss), and pathologic data (i.e. lymphovascular invasion, number of harvested lymph nodes, number of metastatic lymph nodes, and pathologic stage). Artificial neural network used in the experiments is a multilayer perceptron composed of 39 input nodes and 2 output nodes. There are five hidden layers that apply dropouts and batch normalization, and each layer has 100 nodes. The activation function used is Rectifier linear unit (Relu). The prediction accuracy between artificial neural network and statistical method (logistic regression)

was compared with statistical method (logistic regression) using receiver-operating characteristic curves.

Results/Outcome(s): The median follow period of all patients was 41.6 months, during which 1,117 patients had recurrence, and 4,460 patients had no recurrence. Training with such imbalanced data can lead to biased learning in artificial neural networks and we randomly extracted non-recurrence cases at two times the number of recurrence cases. The final analysis included 3,015 cases (non-recurrence cases: 2,010 cases; recurrence cases: 1,005 cases). The independent 224 cases were used for validation of the neural network model. The average accuracy of multilayer perceptron model and logistic regression model was 80.5 (± 6.997)%, 65.41 (± 5.837). The precision, recall score, and F-score of multilayer perceptron model and logistic regression model are the following: multilayer perceptron: 0.8817, 0.7321, and 0.8; logistic regression model: 0.8653, 0.4018, and 0.5478, respectively. The mean area under the curve of the multilayer perceptron model was significantly higher than that of logistic regression model (0.9 ± 0.02 ; 0.77 ± 0.03).

Conclusions/Discussion: We proved the feasibility of using an artificial neural network for predicting colorectal cancer recurrence. The performance of the prediction model was better than a conventional statistical model. Future studies using multicenter clinical data and more number of cases are warranted to validate our study and to apply the results in clinical service.

HOW OFTEN DO PATHOLOGY REPORTS FOR MALIGNANT COLORECTAL POLYPS CONTAIN SUFFICIENT INFORMATION FOR COLORECTAL SURGEONS TO MAKE CLINICAL DECISIONS WHEN ADHERING TO CLINICAL PRACTICE GUIDELINES?

T5

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Purpose/Background: There are typically 3 treatment options for malignant polyps (T1N0M0) following colonoscopic polypectomy: radical oncologic resection, repeat endoluminal therapy, and surveillance. Several histopathological features should prompt consideration of radical resection including tumor budding, high histological grade, positive margin, lymphovascular invasion (LVI), depth of invasion. The College of American Pathologists (CAP) has published guidelines for T1 colorectal cancer pathology reports which list "mandatory" and "optional" elements. Incomplete reports may result in inaccurate tumor risk stratification resulting in under or over-treatment. The aim of our study was to perform a population-based assessment of pathology reporting for T1 colorectal cancers and determine the completeness of reporting for both mandatory and optional CAP elements.

Methods/Interventions: This is a population-based retrospective cohort study of all endoscopically resected T1 colorectal cancers in Alberta, Canada in 2016. Eligible patients aged 18 or older were identified using the Alberta Cancer Board database. Non-residents, familial colorectal cancer conditions and IBD were excluded. Pathology reports were manually reviewed to determine adherence to 2016 CAP guidelines. Mandatory CAP elements: tumour site, size of invasive carcinoma, histological type, histological grade, tumour extension, deep margin, mucosal margin, LVI. Optional elements: specimen integrity, polyp size, polyp configuration, type of polyp in which invasive carcinoma arose, additional pathological findings, ancillary studies. Other variables not in the guidelines but with clinical usefulness: tumour budding, Haggitt level, Sm level, Ueno depth of invasion, Ueno width of invasion.

Results/Outcome(s): Three-hundred-eighty-eight T1 tumors were identified, 245 were excluded. Main reasons for exclusion: no data, biopsy only, deceased, duplicate entry, Crohn's, other malignancy. Mean age was 64.5 years (range 31-90); 61.5% were male. This left 143 endoscopically resected malignant polyps for analysis. Twenty-one (14.7%) reports included all mandatory elements and 15 (10.5%) included all optional elements. All 15 reports which included 6/6 optional elements also included 8/8 mandatory elements. Of required elements, tumour site was most reported at 100%: rectosigmoid or colon in 69.9%, rectum in 27.3%, other in 2.8%. Histological grade was reported in 83.9%: low grade in 93.3%, high grade in 5%, not able to be assessed in 1.7%. Deep margin was reported in 77.6%: involved in 27.9%, could not be assessed in 19.8%, uninvolved in the rest. Mucosal margin was reported in 28.7%: involved in 7.3%, uninvolved in 75.7%, could not be assessed in 17.1%. LVI was reported in 63.0%: present in 10%, absent in 86.7%, undetermined in 3.3%. Tumour extension was reported in 53.1%, size of invasive carcinoma in 30.8%, histological type in 99.3%. Of optional elements specimen integrity was reported in 88.8% (41.7% intact, 58.3% fragmented), polyp size in 100%, polyp configuration in 39.2% (pedunculated 42.9%, sessile 51.8%). Type of polyp in which invasive adenocarcinoma arose was reported in 73.4% (tubular adenoma 47.6%, tubulovillous adenoma 45.7%, other 6.7%). Additional pathological findings were reported in 21.7%, ancillary studies in 26.6%. Of other reported variables Haggitt level was reported in 10.5%, Sm level in 6.3%, Ueno deep invasion in 7.7%, Ueno width of invasion in 0.7%. Tumour budding was reported in 14.7%: absent in 28.6%, low (1-4 buds per hot spot field) in 4.8%, intermediate in 4.8%, high (10+ buds) in 14.3% or just "present" in 28.6%. There were 37.1% high-risk polyps defined as any one of the following: tumour budding present or high-grade, high-grade differentiation, involved mucosal or deep margin, LVI, Ueno depth >2000um, Ueno width >4000um, Sm3. If none of the above criteria were met or the variable was not reported the polyp was considered

low-risk. Thirty-five percent of patients were treated with polypectomy and surveillance versus 65% with surgery (64.9% laparoscopic, 21.3% open, 13.8% transanal endoscopic microsurgery). Final surgical pathology showed R0 resection, no residual malignancy, negative lymph nodes in 72.3%. None had positive lymph nodes.

Conclusions/Discussion: There is a high rate of incomplete reporting of mandatory and optional variables for colorectal pathology reports. In addition, several variables used routinely by colorectal surgeons for decision making such as tumour budding and depth of invasion are infrequently reported. These findings highlight the importance of requesting additional information and/or a 2nd opinion when managing patients with incomplete pathology reports as this information may change management. Additional educational strategies are required to ensure these tumors are properly assessed and reported.

COLORECTAL CANCERS IN AFRICAN AMERICANS: A UNIQUE PATTERN OF MOLECULAR ORIGINS.

T6

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Purpose/Background: There are notable clinical differences between colorectal cancer in African Americans and Caucasians. In African Americans the disease tends to present earlier, is more often right sided, and stage-for-stage is more aggressive. The aim of this study was to analyze the underlying tumor genetics associated with these clinical features, and compare to Caucasians.

Methods/Interventions: A single institution, genetically characterized, colorectal cancer biobank was queried for specimens resected between 2000 and 2008 Each tumor had been analyzed for microsatellite instability (MSI) using a DNA panel, CpG Island Methylator Phenotype (CIMP) by MethyLight quantitative PCR, and *BRAF/KRAS* mutations by PCR. Specimens from African American patients were age-matched with specimens from Caucasian patients. Patients were divided by age into three groups: <56, 56-70, >70 years old. Cancers were divided by location into right (proximal to descending colon), and left (distal to splenic flexure). The incidence of the various genetic and epigenetic events was compared and the results are shown in the table.

Results/Outcome(s): Cancers from 47 African American patients were compared to those from 90 Caucasian patients. Mean age of both groups was 66 years (± 12 SD). Gender distribution was 21:26 Male: Female (African Americans) and 51:39 Caucasians. The following patterns are seen: Young African American patients have mostly right sided cancers but these are not methylated. Young Caucasian patients have mostly left sided cancers and there is infrequent methylation. The predominance

of right sided cancers in African American patients is seen in the later age groups but an increasing minority of them are methylated. Increasing numbers of cancers in older Caucasians are right sided, with most of them due to hypermethylation. 38% of African American patients age ≤ 56 had KRAS mutant cancers (compared to 25% of Caucasians). This increased to 50% of African Americans from age 56 to 70 years. Cancers from Caucasian patients were not as frequently KRAS mutant at any age. A feature of cancers in Caucasian patients over 70 was MSI-H (41%), more than twice the rate of that in African Americans. Cancers in Caucasians also showed an increased incidence of CIMP with age. This is not seen as strongly in African Americans.

Conclusions/Discussion: Colorectal cancers in African Americans and young Caucasians arise mostly through chromosomal instability, especially earlier in life. The main difference between races is that chromosomal unstable cancers are left sided in Caucasians, and right sided in African Americans. This may relate to a prominence of KRAS mutations in the right colon of African Americans, and BRAF mutations in the right colon of Caucasians.

EVOLUTION OF CYTOREDUCTIVE SURGERY AND HIPEC FOR COLORECTAL PERITONEAL METASTASES: 8-YEAR SINGLE INSTITUTIONAL EXPERIENCE.

T7

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Purpose/Background: Colorectal cancer (CRC) is the second leading cause of cancer related mortality worldwide. Peritoneal metastases carry the worst prognosis among all sites of CRC metastases. In recent years, the advent and acceptance of cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) has greatly improved survival for selected patients with low volume peritoneal metastases. Given the population distribution and varied referral patterns in Australia and New Zealand, very few centres can accumulate adequate volumes to report on outcomes. Here, we report our eight-year Australian single institution experience of CRS and HIPEC for colorectal peritoneal metastases (CRPM).

Methods/Interventions: This is a retrospective review from 1 June 2009 to 31 December 2017 of all patients undergoing CRS and HIPEC for isolated colorectal peritoneal metastases.

Results/Outcome(s): One hundred and one cytoreductive surgeries were undertaken during this time for colorectal peritoneal metastases. The median age was 60 years with 55.2% being female. The median Peritoneal Carcinomatosis Index (PCI) was 9, with complete cytoreduction achieved in 76 (75.2%) cases. Grade III or IV

complications occurred in 26 cases (25.7%). There were two (2%) peri-operative mortalities. Systemic chemotherapy was almost universally given, with 93 (92.1%) cases receiving peri-operative chemotherapy. Median overall survival for the entire cohort was 32 months, with a 3-year survival of 38%. For patients who had a complete cytoreduction, median overall survival was 37 months, relapse free survival was 13 months, with a 3-year survival of 54%. Complete cytoreduction, PCI less than 15 and non-mucinous histology were factors associated with improved overall survival.

Conclusions/Discussion: This is the second largest reported Australian series on the outcomes following CRS and HIPEC for isolated low volume CRPM. Our results demonstrate that CRS and HIPEC for isolated low volume colorectal peritoneal metastases is safe and effective. Despite carrying some morbidity, it offers selected patients a highly favorable overall and relapse free survival.

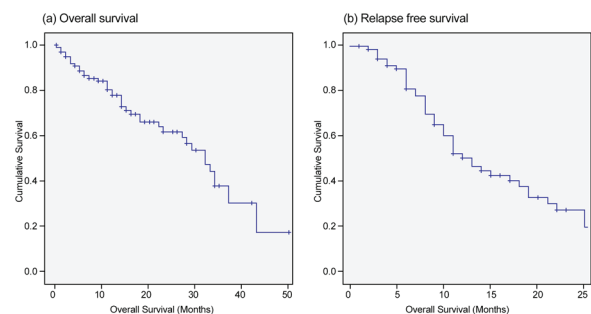


Figure 1a. Overall survival of all cases, with 32 months median survival and 34% 3-year survival. **Figure 1b.** Median relapse-free survival of 13 months after complete cytoreduction.

IS ADJUVANT CHEMOTHERAPY BENEFICIAL FOR PATIENTS WITH LOCALLY ADVANCED RECTAL CANCER WHO HAVE ACHIEVED A COMPLETE PATHOLOGICAL RESPONSE?

T8

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Purpose/Background: In patient with locally advanced rectal cancer (LARC) who have achieved complete pathological response (cPR) following neoadjuvant chemoradiotherapy (CRT) and subsequent R0 resection, it is unclear whether the additional chemotherapy improves the oncological outcomes. International guidelines are changing with respect to adjuvant chemotherapy (ACT) in this subset of patients, with most suggesting that ACT is not required, however should be considered on individual basis (1, 2, 3). Here we investigate the effect of ACT on oncological outcomes in this group of patients, and more specifically whether there is benefit of ACT in patients who are clinically node positive on diagnosis (N+) compared to those who are not (N-).

Methods/Interventions: This is a retrospective study abstracted from a prospectively maintained database (BioGrid). Ethical approval was obtained from BioGrid and Melbourne Health HREC (01804/4). Patients who have LARC from 2003-2017 were included, with rectal cancer defined as <14cm from anal verge confirmed on endoscopy and biopsies. Patients with pre-operative clinical staging of T3/4 N0 or Tx N1-2 were selected. As a requirement, all patients achieved cPR following neoadjuvant CRT and surgery. Baseline and demographic data were retrieved. Our primary outcomes of interest were 5-year overall survival (5y-OS), 5-year recurrence free survival (5y-RFS), in patients who received ACT and those who did not, and then further analysis to determine if patients who were node positive (N+) had different outcomes. Statistical analysis was performed using SPSS (IBM Corp, Armonk, New York, USA) and Microsoft Excel (2010). Chi-squared test was used for categorical variables and Student's t-test for continuous variables. Kaplan-Meier analysis was performed to analyse survival. A p-value <0.05 was considered significant.

Results/Outcome(s): 141 patients met inclusion criteria with pre-operative positive-nodes identified in 104 patients (73.8%). ACT was given to 63 (60.6%) and 27 (73.0%) patients who were N+ and N- respectively. The only significant difference at baseline between the groups was age; mean age receiving ACT was 57.4 ±12 years, compared to 67.1 ±12.2 years ($p=0.022$). Tumour location was in the lower rectum in 52.2% and 56.9% of patients receiving ACT vs no ACT ($p=0.604$), and in the middle rectum in 43.3% and 35.3% respectively ($p=0.377$). Overall surgical complication rate was 36.4%, with patients who received ACT having a lower incidence

(28.7% vs 49.0%, $p=0.019$). Notably, 0% of patients who received ACT had deep wound infection, compared to of 9.8% of patients who had no ACT ($p=0.008$). 75.9% of patients who received ACT completed the intended course (73.7% vs 89.8% patients who were N+ and N-, $p=0.587$). Toxicity requiring early cessation of ACT occurred in 13.3% of patients (15.8% vs 7.7% of patients who were N+ and N-, $p=0.489$). Mean length of hospital stay in ACT vs no ACT was 11.5 ±8.5 and 13.0 ±9.4 days respectively ($p=0.044$). Overall length of follow up was 51.8 ±28.6 months. Kaplan-Meier 5y-OS rates for patients who received ACT vs none were 87% and 93% ($p=0.515$), and 5y-RFS rates were 89.1% and 87.7% respectively ($p=0.831$). On further analysis, patients who were N+ and received ACT vs no ACT had a 5y-OS of 85.1% and 91.5% ($p=0.345$). Patients who were N- and received ACT vs none had a 5y-OS of 94.4% and 87.5% ($p=0.807$). There was no statistical significance between any groups (Graph 1).

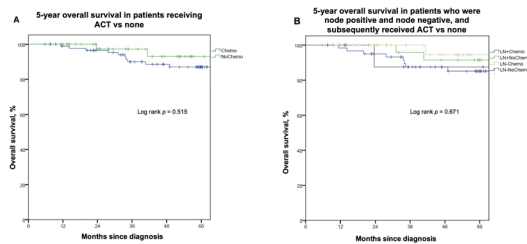
Conclusions/Discussion: This study is one of the largest specifically focusing on oncological outcomes in patients with LARC who have achieved cPR following neoadjuvant CRT and R0 resection. Results of this study support the change in guidelines that ACT may not be required following a cPR to improve oncologic outcomes. Limited by small subgroup size, we were unable to show a benefit of ACT for patients who were N+ on diagnosis. References: 1. Cancer Council Australia Colorectal Cancer Guidelines Working Party. "Clinical Practice Guidelines for the Prevention, Early Detection and Management of Colorectal Cancer." Cancer Council Australia. Last modified Accessed 2018. https://wiki.cancer.org.au/australia/Guidelines:Colorectal_cancer. 2.

T6 Table: Genetic Profiles of Colorectal Cancers by Race, Age, and Cancer Location

Age	Mechanism	<56				56-70				>70			
Race		African American (n=13)		Caucasian (n=24)		African American (n=17)		Caucasian (n=32)		African American (n=17)		Caucasian (n=34)	
Site		Right n=9, 69%	Left n=4, 31%	Right n=8, 33%	Left n=16, 66%	Right n=12, 71%	Left n=5, 29%	Right n=20, 62%	Left n=12, 38%	Right n=14, 82%	Left n=3, 18%	Right n=25, 73%	Left n=9, 27%
CIMP High, MSI-H	Methylator/MLH1 methylated	0	0	0	0	0	0	8(40%)	0	2 (14%)	0	10(40%)	2(22%)
CIMP High, MSS	Methylator	0	0	1(12%)	0	2(17%)	0	5(25%)	0	2 (14%)	0	5(20%)	2(22%)
CIMP low, MSI-H	Possible Lynch	2 (22%)	0	0	1(6%)	2(17%)	1(20%)	1(5%)	2(17%)	1(7%)	0	2(8%)	0
CIMP low, MSS	Chromosomal Instability	7 (78%)	4 (100%)	7(88%)	15 (94%)	8 (66%)	4 (80%)	6 (30%)	10 (83%)	9 (64%)	3 (100%)	8 (32%)	5 (56%)
BRAF		0	0	1(12%)	0	2(17%)	0	5(25%)	0	2(14%)	0	9(36%)	2(22%)
KRAS		4 (44%)	1 (25%)	1 (12%)	6 (38%)	7 (58%)	1 (20%)	6 (30%)	5 (42%)	5 (35%)	1 (33%)	6 (24%)	1 (11%)

B. Glimelius, E.T., A. Cervantes & D. Arnold, on behalf of the ESMO Guidelines and W. Group*, *Rectal cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up*. Annals of Oncology, 2013. 24(Supplement 6): p. vi81-88. 3. Lutz, M.P., et al., *Second St. Gallen European Organisation for Research and Treatment of Cancer Gastrointestinal Cancer Conference: consensus recommendations on controversial issues in the primary treatment of rectal cancer*. Eur J Cancer, 2016. 63: p. 11-24.

Figure 1: A, B: Kaplan-Meier curves for 5-year overall survival (5y-OS). Figure A: 5y-OS comparing ACT vs none. Figure B: 5y-OS comparing node positive ACT vs none, and node negative ACT vs none.



ADJUVANT CHEMOTHERAPY DOES NOT AFFECT RELAPSE-FREE SURVIVAL IN PATIENTS WITH STAGE II & III RECTAL CANCER AFTER NEOADJUVANT CHEMORADIATION & TOTAL MESORECTAL EXCISION.

T9

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Purpose/Background: NCCN guidelines for rectal cancer recommend neoadjuvant chemoradiotherapy (CXRT) followed by surgery and adjuvant chemotherapy (AC) for locally advanced stage II or III rectal cancer (LARC). However, level 1 data from previous European studies have not consistently demonstrated an oncologic benefit from AC in this scenario, and the benefit of AC after neoadjuvant chemoradiation and total mesorectal excision (TME) remains controversial. The goal of this study was to define the clinical benefit of AC in LARC patients within a large US population.

Methods/Interventions: After IRB approval, a retrospective chart review was performed of all Southern California Kaiser Permanente (KPSC) patients with stage II & III rectal cancer who underwent CXRT followed by TME between 2005 and 2016. Demographics, pre- and post-treatment stage, surgical data, treatment information, and recurrence data were collected. Patients were followed until one of the following endpoints: disease recurrence, death or last date of in person follow-up. Local recurrence (LR), distant metastatic recurrence (DM), relapse-free survival (RFS), disease specific (DSS) and overall survival (OS) rate were calculated, and Kaplan-Meier and Cox regression analyses were performed to identify factors

associated with disease recurrence and survival during the study period. SAS was used to perform calculations and a value of $P < 0.05$ was considered significant.

Results/Outcome(s): Of the 862 LARC patients who underwent CXRT followed by TME, there were 348 pre-treatment stage II patients and 514 stage III patients based on endorectal ultrasound, CT and/or MRI. The mean age of diagnosis was 59.9 years old (range 19-89) and 61.9% patients were male ($n=534$). 660 patients underwent AC (76.6%). The mean patient follow-up after TME was 63.0 months (range 3-160 months). Preoperative CXRT doses ranged between 12.6 to 55.8 Gray, and concurrent chemotherapy regimens included capecitabine alone in 607 patients (70.4%), fluorouracil +/- leucovorin in 231 patients (26.8%), folfox in 13 patients (1.5%) and capecitabine and oxaliplatin in 10 patients (1.2%). The mean interval from the end of CXRT to surgery was 7 weeks (range of 15 to 587 days). 620 patients underwent low anterior resection (LAR) with primary anastomosis (with/without stool diversion), 22 patients underwent Hartmann-type resection (LAR without anastomosis and end colostomy) and 213 patients underwent abdominoperineal resection with end colostomy. 60 of the patients underwent en bloc resection of adjacent pelvic organs, including 7 patients who underwent formal pelvic exenterations. Post-XRT pathologic yp stages were recorded as follows: 179 ypT0N0 patients (20.8%), 13 ypTisN0 patients (1.5%), 232 stage 1 patients (26.9%), 209 stage 2 patients (24.2%), and 229 stage 3 patients (26.6%). The yp staging indicated that there were 192 patients with complete pathologic responses (CPR, 22.2%), 343 patients with partial tumor downstaging (39.8%), and 327 patients with no downstaging or tumor upstaging (37.9%). The most common AC regimens were FOLFOX (34%), capecitabine (29%), and CAPEOX (28%), although 202 patients (23%) did not receive any AC. The mean time from TME to AC, if given, was 39.1 days (range 2-196 days). During a mean follow-up of 63.0 months, 40 patients developed local recurrences within the pelvis (4.5%) and 151 patients developed distant metastases (17.5%), including 13 patients who recurred both locally and distantly. Rectal cancer was the cause of death (COD) for 109 patients during the study interval (12.6%). Univariate analysis showed that pre-treatment clinical stage was not predictive of disease recurrence ($P=0.50$), but yp stage was an excellent predictor of RFS ($P=1 \times 10^{-21}$). Multivariate logistic regression revealed that yp stage and en bloc resection (EBR) were the only clinical variables that significantly predicted disease recurrence (HR 2.4, 95% CI 1.41-4.08 and HR 2.76, 95% CI 0.95-8.02). The addition of AC did not improve RFS in the entire cohort nor in any evaluated clinical subgroup ($p > 0.05$ for age, gender, pre-clinical stage, yp stage, downstaged or non-downstaged tumors, or EBR).

Conclusions/Discussion: This retrospective study evaluates of oncologic outcomes for a large US population of

LARC patients who underwent AC after CXRT and TME. In patients with stage II & III rectal cancer treated with neoadjuvant CXRT and TME, yp stage was a much better predictor of RFS than pre-treatment stage. Pre-surgical efforts should be given to maximize the rate of tumor downstaging to decrease the chance of disease recurrence. Moreover, AC did not improve RFS in any studied group in this large cohort. Future studies should confirm these results and delineate the oncologic benefit of AC in this population.

Parameter	Number	Mean Follow Up (months)	Relapse Free Survival	Crude HR (95% CI)	Adjusted HR (95% CI)
Overall	862	63	79.4%	1.01 (0.96-1.06)*	
Sex					
Male	534	62.6	80.0%	Reference	
Female	328	63.6	78.4%	1.08 (0.80-1.48)	0.92 (0.66-1.28)
Age at Diagnosis					
Age 19-49	163	65.2	79.8%	1 (0.99-1.01)	1.01 (0.99-1.02)
Age 50-70	527	64.3	79.7%		
Age 71-89	172	57	77.9%		
Pretreatment Stage					
Stage 2	348	67.3	79.9%	Reference	Reference
Stage 3	514	60.1	79.0%		
TxN1	483	64.1	79.2%	1.08 (0.78-1.49)	0.82 (0.58-1.15)
TxN2	81	38.5	77.8%	1.48 (0.85-2.56)	0.91 (0.51-1.6)
Radiation Dose					
<45 Gy (incomplete)	16	69.9	62.5%	Reference	Reference
45-49.9 Gy	90	77.1	71.1%	0.68 (0.28-1.65)	0.84 (0.33-2.17)
50-54.9 Gy	712	61.1	81.3%	0.46 (0.20-1.04)	0.68 (0.28-1.63)
Interval XRT to Surgery					
<6 wks	86	81.5	75.6%	Reference	
6-10 wks	483	66.6	78.1%	0.9 (0.56-1.45)	
11-14 wks	221	52.9	81.9%	0.85 (0.50-1.45)	
14+ wks	66	45.4	86.4%	0.71 (0.33-1.56)	
En bloc resection					
No	802	63.5	80.7%	Reference	Reference
Yes	60	57	61.7%	2.74 (1.76-4.26)	2.4 (1.41-4.08)
Surgical yp Stage					
CPR/Tis	192	69.8	94.3%	Reference	Reference
Yp Stage 1	232	64.5	89.7%	1.75 (0.85-3.60)	1.73 (0.84-3.59)
Yp Stage 2	209	59.6	75.1%	4.76 (2.47-9.18)	4.15 (2.14-8.04)
Yp Stage 3	229	58.9	60.3%	8.86 (4.46-15.67)	8.48 (4.47-16.07)
Degree of Tumor Downstaging					
CPR	192	69.8	94.3%	0.13 (0.07-0.25)	
Some Downstaging	343	61.6	86.9%	0.32 (0.22-0.45)	
No downstaging	327	60.6	62.7%	Reference	
Adjuvant Chemo					
None	202	69	83.0%	Reference	Reference
Yes	660	61.2	78.2%	1.42 (0.96-2.10)	1.12 (0.72-1.73)

HR = hazard ratio, CI = confidence interval, XRT = radiotherapy, yp = post-radiation surgical stage, CPR = complete pathologic response, Tis = post-radiation non-invasive adenomatous changes
 Highlighted boxes indicate p < 0.05 versus reference
 * Crude HR calculated for year of diagnosis

Multivariate Analysis of Clinical Predictors for Relapse Free Survival

VENOUS THROMBOEMBOLISM (VTE) IN COLON CANCER: A POPULATION-BASED COHORT STUDY OF VTE RATES FOLLOWING SURGERY AND DURING ADJUVANT CHEMOTHERAPY.

T10

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Purpose/Background: There is an elevated risk of venous thromboembolism (VTE) in patients treated for colon cancer. Postoperative VTE (i.e. within 30 days of surgery) has been studied previously, but no large study has compared the risks of VTE during different stages of treatment. The objective of this study is to quantify and compare the risks of VTE prior to surgery, after surgery, during adjuvant chemotherapy (ACT), and up to 365 days post-surgery among patients with resected colon cancer.

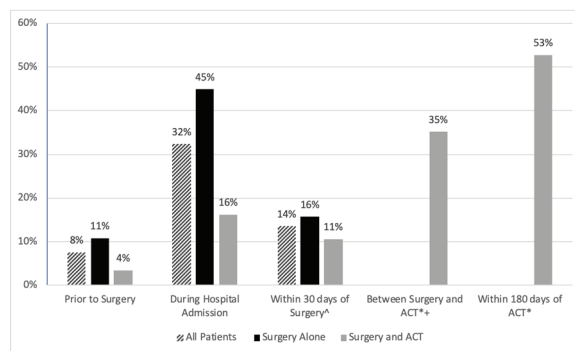
Methods/Interventions: In this population-based retrospective cohort study, patients with stage I-III colon cancer treated with surgical resection between 2002-2008 were identified through the Ontario Cancer Registry (OCR) and hospitalization records. The exposures of interest were surgical resection, ACT, and stage of treatment, the latter of which was defined as preoperative (90 days prior to

surgery), in-hospital, postoperative, during administration of adjuvant chemotherapy, and up to 365 days postoperatively. The primary outcome was the development of VTE, as defined using diagnostic codes from administrative data sources. Other outcomes included overall survival (OS) and cancer-specific survival (CSS).

Results/Outcome(s): Of the 6,806 patients included in this study, 327 (5%) developed a VTE. Patients receiving ACT had a higher risk of VTE versus patients who underwent surgery alone (6% vs. 4%, P < 0.001). 46% of all diagnosed VTE occurred within 30 days of surgery. Patients receiving ACT were more likely to be diagnosed with a VTE while receiving ACT (53%) than in the 30 day postoperative period (26%). VTE was an independent risk factor for worse 5 year overall survival (HR 1.65, 95%CI 1.43 – 1.91, P < 0.001) and cancer-specific survival (HR 1.84, 95%CI 1.55 – 2.18, P < 0.001).

Conclusions/Discussion: Patients who undergo treatment for early-stage colon cancer are at considerable risk of developing VTE. The risk is elevated in those who require adjuvant chemotherapy, and VTE is associated with worse long-term outcomes. There may be a role of VTE prophylaxis during all phases of treatment, including both postsurgical and during adjuvant chemotherapy.

Figure 2: The proportion of diagnosed VTE, by treatment period. Total Diagnosed VTE = 327 (n = 185 in the surgery alone group, n = 142 in the ACT group)



* Between discharge and 30 days from surgery
 ** Only those who received Adjuvant Chemotherapy
 + Includes VTE diagnosed at any point between surgery and start of ACT, including during hospital admission, within 30 days of surgery
 ACT Adjuvant Chemotherapy

FUNCTIONAL DECLINE AFTER HIGH RISK COLORECTAL PROCEDURES IN OLDER ADULTS.

W2

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Purpose/Background: Patients value functional outcomes highly when considering high-risk procedures. Yet, traditional surgical outcomes focus mainly on survival and short-term complications. Little is known about the risk of functional disability after high-risk colorectal procedures (greater than 1% inpatient mortality), and whether

functional disability is confined to patients who experience complications. We evaluated data from a nationally representative survey on aging and health to understand the incidence and risk of functional decline after high-risk colorectal operations and better inform patient-centered surgical decision making for older adults.

Methods/Interventions: We analyzed a dataset linking the Health and Retirement Study (HRS), administrative claims from Medicare, and the National Death Index from 1992 to 2012. HRS is a longitudinal survey of community-dwelling adults followed from pre-retirement age and interviewed every two years. Linked Medicare data is available for over 85% of HRS participants over age 65. Assistance needs for 6 activities of daily living (ADL) and 5 instrumental ADL (IADL) are measured in HRS. The sum of ADLs and IADLs requiring assistance was grouped into 3 categories to define functional status (0 = no functional limitations, 1-3 = mild to moderate limitation, ≥ 4 = severe functional limitation). The primary outcome, functional decline, was defined as an increase in limitation category from before the index surgery or baseline. All patients who underwent elective high-risk colorectal surgery and whose functional status was measured both before and after surgery were included. We matched each surgery patient to 3 survey respondents who did not undergo major surgery, according to a propensity model derived from sex, race, age, education, marital status, comorbidities, baseline cognitive status, baseline functional status, and year of survey. The main exposures were surgery with and without complications. Using logistic regression, we examined the association between the main exposures and functional decline. We then evaluated the association between functional decline and overall survival using a proportional hazards model.

Results/Outcome(s): We included 289 patients who underwent high risk colon surgery and 867 non-surgery controls. Of the surgery patients, 31% experienced a complication, most commonly gastrointestinal hemorrhage, surgical site infection, and pulmonary failure. Compared to the non-surgery cohort, surgery patients with and without complications experienced greater odds of functional decline (OR 1.82, 95% CI 1.22-2.71 and OR 2.96, 95% CI 1.70-5.14, respectively). Adjusted rates of functional decline are shown in Figure 1. Functional decline was also associated with increasing age (OR 1.07, 95% CI 1.05-1.11), and both moderate and severe baseline cognitive impairment (OR 1.66, 95% CI 1.05-2.65 and OR 4.26, 95% CI 1.45-12.53, respectively). Adjusted overall 5-year survival was significantly worse among surgery patients with functional decline than for those without functional decline (61.1% versus 72.1%; $p=0.01$).

Conclusions/Discussion: High-risk colorectal surgery, with or without complications, is associated with a significantly increased risk of functional decline in older adults. Worsening functional decline, in turn, is significantly associated with worse overall 5-year survival. Patient-centered

decision-making about major colorectal surgery should include discussion of expected functional outcomes and disability, rather than focusing only on the risk of traditional perioperative complications.

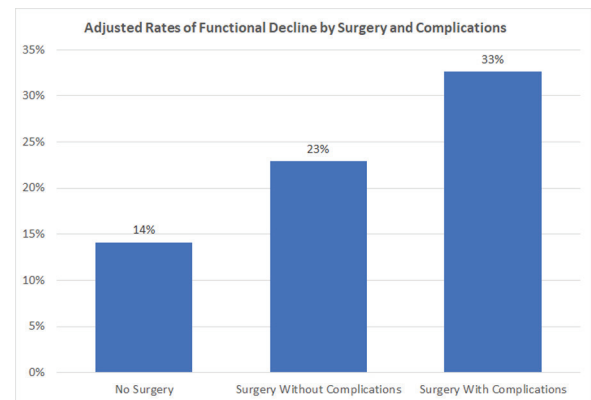


Figure 1: Rates of functional decline adjusted for sociodemographic characteristics, comorbidities, baseline cognitive and functional status, and year of survey.

THE HARMFUL ASSOCIATION BETWEEN ROBOTIC SURGERY AND COLORECTAL CANCER SURGERY AMONGST FRAIL PATIENTS.

W3

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Purpose/Background: Minimally invasive surgical techniques are often promoted over open surgery because of improved patient outcomes. Robotic surgery leads to lower post-operative pain, lower intraoperative transfusion requirements, decreased post-operative hospital length of stay, and lower infection rates. However, the impact of robotic surgery on certain subsets of the population, such as frail patients, is poorly understood. With the continued growth of the elderly population in the United States, the impact of frailty on the risk-stratification of surgical patients has become increasingly important. Though much research has been conducted on frailty as a risk factor for post-operative outcomes, little information is available on the impact that laparoscopic and robotic surgical approaches have for frail patients. The purpose of our study was to examine the interaction between frailty and minimally invasive surgical approaches on outcomes following colon cancer surgery.

Methods/Interventions: Patients undergoing an open, laparoscopic, or robotic colectomy for colon cancer between 2012 and 2016 were identified from the American College of Surgeon's National Surgical Quality Improvement Program (NSQIP) database. Frailty was defined using the modified Frailty Index (mFI), which was scored from 0 (least frail) to 5 (most frail), based on the presence of

0 to 5 frailty proxy characteristics in the NSQIP database. Thirty-day surgical outcomes were compared by mFI and surgical approach using doubly robust multivariable logistic regression with propensity score weighting. The interaction effect of mFI and surgical approach on surgical outcomes was also tested.

Results/Outcome(s): After propensity score weighting of colectomy patients, 33.8% (N = 27,649) underwent an open approach versus 34.3% (N = 28,058) laparoscopic versus 31.9% (N = 26,096) robotic. Robotic (OR 0.53, 95% CI 0.42-0.69, $p < 0.001$) and laparoscopic (OR 0.58, 95% CI 0.52-0.66, $p < 0.001$) surgeries were independently associated with decreased rates of major complications overall compared to open surgery. Patients with higher modified Frailty Indices (mFI = 3 or 4) had higher complication rates (OR 1.56 for mFI=3, 95% CI 1.07-2.25, $p = 0.018$), irrespective of surgical approach. However, when considering the interaction effects between surgical approach and frailty, frailer patients undergoing robotic surgery had a three-fold increase in a major complication (combined adjusted OR 3.15, 95% CI 1.34-7.45, $p = 0.006$) compared to patients undergoing open surgery (Figure.)

Conclusions/Discussion: While minimally invasive approaches have decreased post-operative complications, this effect may be reversed in frailer patients who undergo robotic surgery. Frailer patients are 3.15 times more likely to have a major complication following robotic surgery compared to equally frail patients undergoing open surgery. These findings challenge current decision-making paradigms for minimally invasive surgery. We should carefully consider the impact of frailty when determining surgical approach in the treatment of colon cancer.

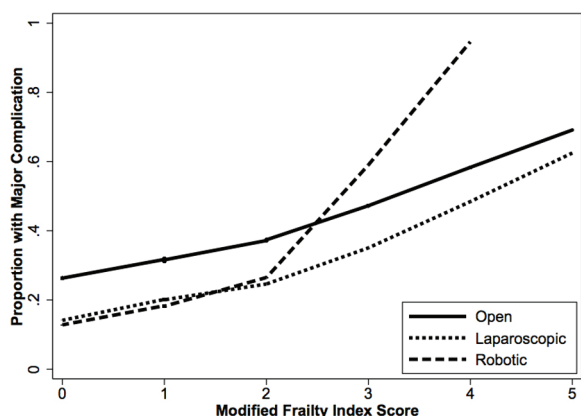


Figure: The association between frailty and outcomes following colon cancer surgery stratified by surgical approach. Robotic surgery has a 3.15-fold increase in major complication rate compared to open surgery.

LOW ANTERIOR RESECTION SYNDROME AFTER TRANSANAL TOTAL MESORECTAL EXCISION – A COMPARISON WITH THE CONVENTIONAL TOP TO BOTTOM APPROACH.

W4

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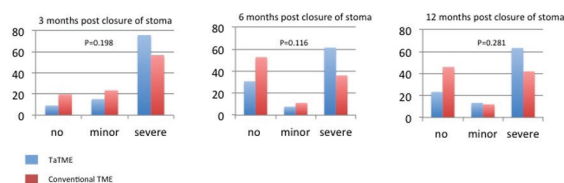
Purpose/Background: Advances in sphincter saving procedures improved the quality of life of patients with low rectal cancer. However, many of them suffered from a varying degree of functional disturbance after surgery, which is collectively known as the low anterior resection syndrome (LARS). The prevalence of LARS after transanal total mesorectal excision (TaTME) was not well described in the literature. The aim of this study was to evaluate the prevalence and severity of LARS after TaTME and compare with the conventional transabdominal, top to bottom, approach after total mesorectal excision (TME).

Methods/Interventions: All patients who underwent TME from January 2016 to April 2018 for mid to low rectal cancer were followed-up with a questionnaire. The LARS score at 3, 6 and 12 months after closure of stoma were prospectively recorded.

Results/Outcome(s): A total of 84 patients responded. All had diversion stoma. 70.2% were male. 36.9% had neoadjuvant radiotherapy. 39.3% of them underwent TaTME. At 3, 6 and 12 months after closure of stoma, the median LARS score were 39.0, 34.5 & 34.0 respectively. These were significantly worse compared to those who underwent the conventional approach, 32.0 ($p = 0.026$), 23.0 ($p = 0.007$) & 18.0 ($p = 0.036$). Patients who underwent TaTME did have a significantly more distal anastomosis, at a median of 4cm from the anal verge, compared to 5cm in the conventional group ($p = 0.002$).

Conclusions/Discussion: Patients after TaTME may be more prone to LARS compared to the conventional approach. This difference persisted at 1 year after stoma closure.

Low Anterior Resection Syndrome Post Total Mesorectal Excision



Time post stoma closure	TaTME Median LARS score	Conventional TME Median LARS score	p (Mann-Whitney Test)
3 months	39.0	32.0	0.026
6 months	34.5	23.0	0.007
12 months	34.0	18.0	0.036

IMPACT OF THE ACA MEDICAID EXPANSION ON RATES OF SURGERY FOR DIVERTICULITIS IN MEDICAID PATIENTS: DOES INCREASED ACCESS RESULT IN INCREASED UTILIZATION?

W5

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Purpose/Background: Several provisional changes that were implemented as a part of the Affordable Care Act (ACA) had the potential to impact surgical care profoundly. Prior studies including the RAND Healthcare Insurance Experiment and the Oregon Medicaid Study have suggested that when the price of healthcare services are reduced, utilization of healthcare resources increases. It remains controversial as to whether or not the increased use of healthcare resources results in an improvement in health. This study aimed to analyze the effect that the ACA Medicaid expansion had on the rates of surgery for diverticulitis. We hypothesized that the increase in access for low-income patients resulting from the Medicaid expansion would result in increased utilization of surgery for diverticulitis in these patients.

Methods/Interventions: We used the Healthcare Cost and Utilization Project State Inpatient Database to evaluate rates of surgery for diverticular disease pre (2010 to 2013) and post (2014) Medicaid expansion. We compared states that participated in Medicaid Expansion (IA, MD, and NY) to those that did not (FL and NC). Diverticulitis related diagnosis and procedures were identified based on ICD-9 codes. We included adult patients between the ages of 18-64 on Medicaid or private insurance and self-pay. We excluded Medicare patients and those 65 or older since they did not gain access as a result of the Medicaid expansion. The primary outcome of interest was the rate of surgical procedures pre and post ACA Medicaid expansion. Multivariable Poisson regression was used to analyze the differences in incidence rate ratios (IRR) and adjust for potential confounders. The US Census data was used to account for population changes in each state over time.

Results/Outcome(s): There was a total of 159,419 patients in our cohort analysis. 75,575 (49%) in expansion states and 82,384 (51%) in non-expansion states. On univariate analysis, there was a greater proportion of Medicaid patients undergoing surgery for diverticulitis after the expansion in expansion states compared to non-expansion states (19.8% vs. 8.7%). We also found that the proportion of self-pay patients undergoing surgery after the expansion was lower in expansion states compared to non-expansion states (2.6% vs. 11.2%). In multivariable Poisson regression, the rate of surgical procedures for diverticular disease increased among Medicaid patients (IRR 1.80; $p < .01$) whereas in self-pay patients surgery decreased (IRR 0.67; $p < .01$) in expansion states compared to non-expansion states. There was also an increase in

the rate of Medicaid patients undergoing elective (IRR 1.60; $p < .01$), urgent (IRR 2.17; $p < .01$) and emergent (IRR 1.89; $p < .01$) surgery in expansion states compared to non-expansion states (Table 1).

Conclusions/Discussion: In states that expanded Medicaid coverage under the ACA, there was an increase in the rate of Medicaid patients undergoing surgery for diverticulitis compared to non-expansion states. From an economic standpoint, this may suggest a large price elasticity for diverticulitis care. Furthermore, this suggests that increased access to care results in increased utilization of healthcare resources even when it comes to surgery for diverticulitis.

Table 1. Risk Adjusted rates of surgery pre and post ACA by insurance and admission type

	expansion			non-expansion			DID	IRR	P
	Pre	Post	Change in Rate	Pre	Post	Change in Rate			
Insurance type									
Medicaid Insurance	15.00	17.96	2.96	14.79	13.60	-1.20	4.15	1.80	0.00
Private Insurance	25.22	26.11	0.89	25.48	25.20	-0.29	1.18	0.96	0.14
Self-Pay	13.68	12.47	-1.21	14.10	12.89	-1.21	0.00	0.67	0.00
Admission type									
Emergency	8.19	10.22	2.03	9.69	8.75	-0.94	2.97	1.89	0.00
Urgent	15.99	23.13	7.14	19.19	14.43	-4.76	11.90	2.17	0.01
Elective	67.98	68.89	0.92	57.94	56.88	-1.06	1.98	1.60	0.00

Pre-ACA period is from 2010 to 2013; Post-ACA is 2014. Adjusted for age, gender, race and comorbidities. Incidence rate ratio (IRR); difference-in-difference (DID).

REGIONAL VARIATION IN THE UTILIZATION OF LAPAROSCOPY FOR THE TREATMENT OF RECTAL CANCER: THE IMPORTANCE OF FELLOWSHIP TRAINING SITES.

W6

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Purpose/Background: Laparoscopic rectal surgery is becoming more commonly used since its introduction and has been associated with improved perioperative outcomes in specific circumstances. Uptake is variable and is likely influenced by factors beyond patient or tumor characteristics, including the local expertise of surgeons. The objective of this study was to determine if the proximity to fellowship training sites influenced the utilization of laparoscopy in rectal cancer.

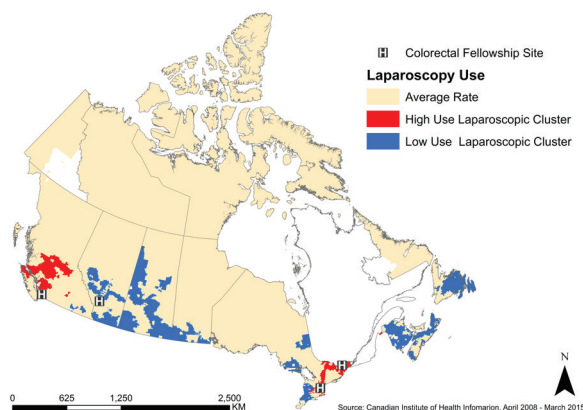
Methods/Interventions: This population-based study assessed all patients ≥ 18 years old who underwent an elective rectal resection for cancer between April 2008 and March 2015 in Canada. Data was derived from the Canadian Institute for Health Information Discharge Abstract Database. The main outcome of interest was the use of laparoscopy at the individual level. Predictors of laparoscopy use included patient and disease characteristics, rural status, hospital and surgeon volumes, and patient's home distance from a colorectal fellowship training center. Hierarchical logistic regression, with year as a random effect, was utilized to evaluate the odds of laparoscopy use.

Results/Outcome(s): Overall, 10,994 patients underwent surgery for rectal cancer. Laparoscopy rates were

25%. There was no significant difference in the general patient or disease characteristics between laparoscopic and open surgery group, except significantly more females underwent open surgery ($P=0.004$). Increasing patient distance from a colorectal training center was inversely associated with undergoing laparoscopic rectal surgery ($P<0.001$). High volume hospitals and surgeon's volume were significantly associated with increased rates of laparoscopy ($P<0.001$). Patients who lived within 25km of a colorectal fellowship training site had a 2.5 times higher odds of laparoscopy use and those who lived within 26-100km had a 1.8 times higher odds of laparoscopy, regardless of the hospital they received care at (95%CI 2.14-2.71, $P<0.001$, 95%CI 1.64-2.07, $P<0.001$ respectively). Figure 1 depicts the neighborhood spatial analysis which found significant clustering of high laparoscopy use neighborhoods around colorectal training sites.

Conclusions/Discussion: The present study identified an unequal utilization of laparoscopy for rectal cancer within Canada. After adjustment for pertinent patient and system factors, increasing distance from a colorectal fellowship training site was inversely associated with undergoing a laparoscopic rectal resection. These data highlight the regional variation in rectal cancer care in a publicly funded health care system and further demonstrates disparity in Canadian healthcare delivery.

Laparoscopy Use in Elective Rectal Cancer Surgery



PREDICTING POST-OPERATIVE COMPLICATIONS FOLLOWING ELECTIVE COLORECTAL SURGERY - CLINICAL UTILITY OF A CRP-BASED APPROACH.

W7

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Purpose/Background: The post-operative systemic inflammatory response (SIR) has value in identifying patients at risk of post-operative complications following colorectal surgery. Numerous C-reactive protein

(CRP)-based approaches have been described to date, however which of these approaches has the greatest clinical utility is unclear. Furthermore, it is recognised that a number of pre- and intra-operative characteristics may affect both the post-operative SIR and risk of complications. The present study aimed to examine the clinical utility of different CRP-based in predicting post-operative complications in the context of a colorectal enhanced recovery after surgery (ERAS) programme. In addition, the interrelationships between a number of pre- and intra-operative characteristics, the post-operative SIR and complications were examined.

Methods/Interventions: Consecutive patients undergoing elective surgery and managed as part of a colorectal ERAS programme in a university-affiliated teaching hospital between March 2016 and August 2017 were included. Post-operative management of patients was standardised according to the institutional ERAS protocol. Complication grade was recorded retrospectively from electronic case records using the Clavien-Dindo (CD) classification. Three different CRP-based post-operative SIR scores were compared with respect to their clinical utility in predicting complications using multivariate logistic regression: post-op day 3 CRP threshold breach (150mg/L); change in CRP (50mg/L/24hrs, or 100mg/L/48hrs), and the day 3 post-operative Glasgow Prognostic Score (poGPS: 0-CRP \leq 150mg/L, 1-CRP $>$ 150mg/L, 2-CRP $>$ 150mg/L and albumin $<$ 25g/L). The interrelationships between the candidate score thought to have greatest clinical utility, pre- and intra-operative characteristics and complications was subsequently examined with binary logistic regression and Chi-square analysis.

Results/Outcome(s): 387 patients were included (median age 63yrs, 51% male, 63% malignant disease). On univariate binary logistic regression analysis, all CRP-based approaches were associated with the development of any complication (all $P<0.001$). On multivariate analysis, only day 3 poGPS (OR 2.48, 95% CI 1.57-3.91, $P<0.001$) remained independent; 35% of patients with poGPS0 developed a complication, compared to 60% and 84% of patients with poGPS1 and 2 respectively ($P<0.001$); 3%, 7% and 13% of patients developed a CD grade 3-5 complication respectively ($P<0.001$). Median length of stay increased with increasing poGPS ($P<0.001$). The relationship between poGPS, pre- and intra-operative characteristics and post-operative complications was examined using binary logistic regression. On multivariate analysis, pre-operative neutrophil:lymphocyte ratio $>$ 5 (OR 1.84, 95%CI 1.0-3.39, $P=0.05$), anaemia (OR 2.0, 95%CI 1.16-3.46, $P=0.013$), operation time $>$ 3 hours (OR 2.14, 95%CI 1.25-3.69, $P=0.006$), epidural use (OR 2.68, 95%CI 1.25-5.76, $P=0.012$) and poGPS (OR 2.96, 95%CI 1.97-4.44, $P<0.001$) were independently associated with complication rate. Using these characteristics, a novel cumulative risk score was proposed, with an incremental increase in score associated with increasing risk of complications

(score 0 – 25% vs. score 4 – 87%, $P < 0.001$). Finally, pre- and intra-operative characteristics that may impact upon post-operative day 3 CRP were examined. On multivariate analysis, pre-operative anaemia (OR 2.66, 95%CI 1.17-6.07, $P = 0.02$) was associated with a higher day 3 CRP, whereas laparoscopic (OR 0.42, 95%CI 0.18-0.96, $P = 0.04$) or lap-assisted surgery (OR 0.18 95%CI 0.04-0.69, $P = 0.013$) and dexamethasone > 4 mg on induction (OR 0.47, 95%CI 0.20-1.13, $P = 0.091$) were associated with a lower CRP.

Conclusions/Discussion: The present study identifies the poGPS, a novel CRP-based score, as a predictor of complications in patients undergoing elective colorectal surgery within an ERAS programme. Such a score, when considered in the context of other pre- and intra-operative factors including anaemia, operation duration and epidural use, may aid in not only identifying patients suitable for early discharge (i.e. low risk), but also those who may benefit from enhanced observation and potentially early investigation for complications in the post-operative period. In addition, the present study identified a number of factors associated with post-operative peak CRP concentration on day 3. Although such characteristics may be potential targets for intervention, whether this will in turn impact favourably upon complication rates remains to be determined.

STRATEGIES OF CULTURALLY COMPETENT PROVIDERS TO MITIGATE INEQUITIES IN CARE FOR DIVERSE COLORECTAL CANCER PATIENTS: A MIXED METHODS COMPARISON STUDY.

W8

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Purpose/Background: Patients from minority, immigrant, and disadvantaged backgrounds have worse outcomes in colorectal cancer. Improving the cultural competence of providers is one means by which sociodemographic inequities may be mitigated. Provider cultural competence is an understanding of the impact of social and cultural influences on the patient's health, usually done through focused training experiences to ensure quality healthcare for diverse patients. However, the extent to how much cultural competence impacts patient care is not well described in the colorectal cancer literature. The objective of this research was to understand how culturally competent providers care for colorectal cancer patients compared to less competent providers.

Methods/Interventions: For the quantitative component of the study, providers in an academic tertiary cancer center were recruited to participate in an online survey that measured level of cultural competency (CC). The

scores were dichotomized into high and low CC based on the 50th percentile from the cultural competency behavioral (CCB) subscale. For the qualitative component of the study, criterion-based purposeful sampling by CCB level was utilized to ensure recruitment from each group. The semi-structured interviews focused on sociodemographic barriers to care, provider communication approaches, and coordination of care strategies. The codebook was iteratively developed using both inductive and deductive analytic approaches. The inter-rater reliability between the two coders was high ($\kappa = 0.76$). Emergent themes compare and contrast provider strategies between high and low CCB.

Results/Outcome(s): 36/46 providers completed the cultural competence survey (response rate = 78%). High CCB scores ranged from 4.6 – 6.9 and low CCB scores ranged from 2.9-4.5 (possible range on CCB = 1-7). We conducted 20 semi-structured interviews with nurse coordinators, APPs, surgeons and oncologists who completed the survey. The participants were equally divided into the high (CCB > 4.5) and low (CCB ≤ 4.5) cultural competency provider groups. In addressing cultural health beliefs, both provider groups were sensitive, respectful, and negotiated the cultural preferences of patients. However, high CC providers worked to resolve and understand cultural differences, taught others when they made mistakes, and made additional efforts to research cultural health beliefs. We also found that both provider groups alleviated health literacy barriers by simplifying the information at the appropriate level for patients, providing additional resources, and utilizing interpreters. High CC providers went further, however, to confirm that patients understood health information by reassessing patients' comprehension, providing additional appointments and phone calls, and involving family members in care. Low CC providers expected patients to be proactive with their care and did not provide additional support. Finally, in coordinating care for patients, high CC providers functioned similarly to patient navigators. They specifically ensured that patients understood the importance of appointments, engaged family members in coordination, followed up to ensure appointments were scheduled and occurred, ensured patients were getting the appropriate treatment, and closed the communication loop between multiple providers in the care team.

Conclusions/Discussion: All providers displayed cultural sensitivity and respect. Providers with high levels of cultural competency went further in providing support to alleviate health literacy barriers and coordinate care. Particularly, there were clear strategies to confirm knowledge and close the loop on communication. When cultural conflicts arose with patients, high CC providers made a special effort to research cultural health beliefs, resolve conflicts and teach team members how to be culturally sensitive during clinical interactions with patients.

OPIOID PRESCRIPTIONS AFTER HEMORRHOIDECTOMY: A NEED FOR EVIDENCE BASED GUIDELINES.

W9

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Purpose/Background: There is currently an opioid epidemic in the United States. Of opioid naïve patients prescribed an opioid after surgery, approximately 6% become chronic users. Hemorrhoids are a common condition that affect nearly 1 million adults per year. Surgical hemorrhoidectomy is an effective outpatient procedure, but is associated with significant post-operative pain. There are currently no evidence-based prescribing guidelines for post-hemorrhoidectomy patients. We sought to examine the patterns of opioid prescribing after hemorrhoidectomy, and to identify factors associated with need for opioid refill.

Methods/Interventions: The Department of Defense Military Health System Data Repository (2006-2014) was used to identify opioid naïve patients over age 18 enrolled in the TRICARE insurance program who underwent surgical hemorrhoidectomy. Patients undergoing rubber band ligation were excluded. Opioid naivety was defined as not receiving an opioid prescription 6 months prior to hemorrhoidectomy. A second opioid prescription was defined as receiving an opioid prescription within 2 weeks of the initial post-surgical prescription's end date. Descriptive statistics with two sample independent t-tests and Chi square tests were performed. Multivariable logistic regression was performed to identify predictors of opioid prescription refill.

Results/Outcome(s): A total of 9,859 patients met inclusion criteria. 6,608 (67.0%) patients received at least one opioid prescription postoperatively with a median supply of 5 days (IQR 3-7). Of these, 2,050 (31.0%) patients required an opioid prescription refill. The most common narcotic prescriptions were oxycodone (56.1%) and hydrocodone (34.9%) (**Figure 1**). In univariate analysis comparing the no refill group with the refill group, there was no significant difference in length of initial opioid prescription, Charlson score, history of fibromyalgia or inflammatory bowel disease (all $p > 0.05$). The patients in the no refill group were older, (45 years [36-54] vs. 43 years [34-52], $p < 0.001$), more likely to be female (48.6% vs 45.5%, $p = 0.02$), less likely to have a history of substance abuse (0.24% vs 0.68%, $p = 0.007$), and less likely to have had a postoperative complication (3.0% vs 6.8%, $p < 0.001$) compared to the refill group. In multivariable logistic regression, independent predictors of receiving an opioid refill prescription were Charlson score greater than 0, (OR 1.4, 95%CI 1.1-1.8 $p = 0.01$, history of substance abuse (OR 3.0, 95%CI 1.4-6.4, $p = 0.006$), and having a postoperative complication (OR 2.4, 95%CI 1.9-3.1, $p < 0.001$). Older age (OR 0.98, 95%CI 0.98-0.99, $p < 0.001$)

and female gender (OR 0.86, 95%CI 0.77-0.95, $p = 0.004$) were associated with decreased odds of receiving an opioid prescription refill.

Conclusions/Discussion: There is wide variability with regard to type and duration of opioids prescribed after hemorrhoidectomy. Approximately one third of postoperative patients require a second prescription in the immediate postoperative period. Evidence-based guidelines for post-hemorrhoidectomy discharge opioid prescriptions are needed.

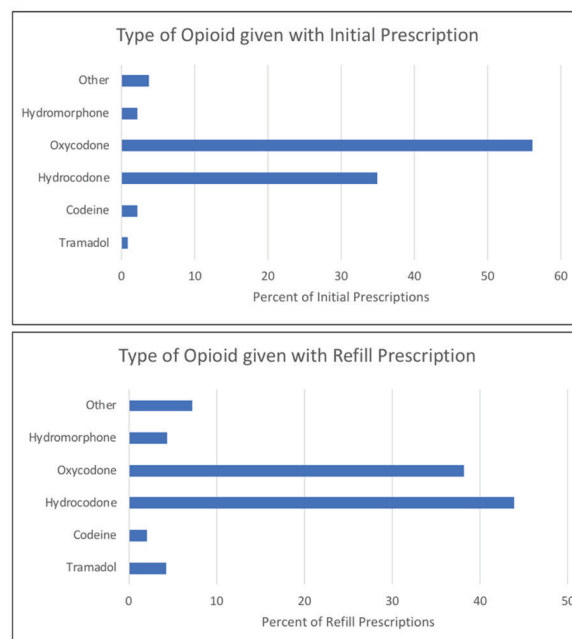


Figure 1: Types of opioids prescribed

DOES A COLORECTAL ENHANCED RECOVERY PROGRAM IMPACT OSTOMY RELATED READMISSIONS?

W10

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Purpose/Background: Patients with an ostomy are at increased risk of readmission and often require inpatient regulation of ostomy output to prevent dehydration. Enhanced Recovery Programs (ERPs) use multifaceted approaches to reduce physiologic stress following surgery and are associated with reduced length of stay, yet the impact of ERP on ostomy patients remains unclear. We hypothesized that a Colorectal ERP is associated with a shorter postoperative length of stay (pLOS) but higher rate of readmission in patients with a new ostomy.

Methods/Interventions: We performed a retrospective cohort study of colorectal surgery patients who had a new ostomy constructed or revised. A Pre-ERP group consisted of patients undergoing surgery between 2012-2014 and

were identified using the institutional American College of Surgeons National Surgical Quality Improvement Project database. The ERP group included patients undergoing surgery between 2015-2017 under a colorectal ERP and were identified in a prospectively maintained database. Patients with an ostomy were identified using procedure codes. The primary outcomes of interest were pLOS and 30-day postoperative readmission. Multivariate linear regression was used to evaluate the association between ERP and pLOS, and logistic regression was used to evaluate the association between ERP and readmissions, adjusting for patient and procedure factors. Reasons for readmissions were abstracted from patients in the ERP group.

Results/Outcome(s): We identified 375 patients undergoing colorectal surgery with creation of a new ostomy including 228 patients before and 159 after ERP implementation. Overall, 53.6% of patients had an ileostomy and 46.4% had a colostomy. Median pLOS was significantly lower following ERAS implementation (Pre-ERP 6 days vs. ERP 4 days; $p < 0.01$). However, readmission rates were significantly higher following ERP implementation (Pre-ERP 13.8% vs ERP 23.4%; $p = 0.02$). Following adjustment for patient and procedure factors, ERP was significantly associated with shorter postoperative length of stay (-1.6 days, 95%CI: 0.7-2.5) and higher readmission rate (OR 1.81, 95%CI: 1.05-3.12). Similar trends were shown when stratified by ostomy type: for patients with an ileostomy, median pLOS before and after ERP was 5 vs 4 days ($p < 0.01$) and readmission rates were 14.8% vs. 24.7% ($p = 0.08$). For patients with a colostomy, median pLOS before and after ERP was 7 vs 4 days ($p < 0.01$) and readmission rates were 12.8% vs 21.5% ($p = 0.13$). The most common cause of readmission was high ostomy output/dehydration (29.7% of all readmissions), and this accounted for 43.5% of all readmissions in patients with an ileostomy.

Conclusions/Discussion: Implementation of a Colorectal ERP was associated with shorter pLOS but higher readmission rates in patients with a new ostomy. Many readmissions were related to dehydration/high ostomy output, especially in patients with an ileostomy. Post-discharge interventions to assist patients with a new ostomy may be needed when implementing a Colorectal ERP.

GENDER DISPARITIES IN THE EXPERIENCES OF COLON AND RECTAL SURGEONS.

W15

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Purpose/Background: The number of women in colon and rectal surgery continues to grow. Over the years, there have been multiple studies seeking explore the differences in experiences of men and women in various medical fields. To date, no such study has been performed in the field of colon and rectal surgery. This study seeks to survey both male and

female colorectal surgeons to survey their individual experiences through their education, training, and careers.

Methods/Interventions: A 57-question survey was created to explore general demographic information as well as specific questions regarding education, training, career experience, compensation, domestic responsibilities, personal experiences of discrimination based on gender, sexual harassment, as well as satisfaction in various areas of the participant's life. Using email addresses from the ASCRS member database, the electronic survey was sent to active members of the society with an accompanying request to participate in the survey. An initial introduction email was sent, inviting prospective participants, and then weekly reminder emails were sent to those who had not yet responded. The survey remained open for a period of one month.

Results/Outcome(s): The survey was disseminated to 2,607 individuals, with the composition of the prospective participants being 25% female. Three hundred eleven individuals participated in the survey, for a response rate of 11.9%. Female respondents accounted for 28.1% of the survey population. Female participants were significantly younger than the male participants 43 vs. 52 ($p < 0.001$). No differences were noted in the number of years spent in residency and fellowship training, the number of hours worked per week, or the number of published journal articles. The median income for both male and female colorectal surgeons was \$350,000 (IQR: \$275,000-450,000 and \$264,000-400,000, respectively; $p = 0.338$). During education, training, and careers; compared to men, more women reported that they had experienced discrimination in medical school (15.1% vs. 64.4%; $p < 0.001$), as a residency applicant (6.4% vs. 60.9%; $p < 0.001$), in residency (8.7% vs. 79.1%; $p < 0.001$), as a fellowship applicant (7.8% vs. 47.1%; $p < 0.001$), as a fellow (6.8% vs. 46.0% $p < 0.001$), and when applying for their first jobs (9.1 vs. 47.1%; $p < 0.001$). In the area of sexual harassment, women reported more frequently being the victims of such behavior in medical school (7.5% vs. 47.1%; $p < 0.001$), residency (9.9% vs. 60.9%; $p < 0.001$), and fellowship (6.1% vs. 31.0%; $p < 0.001$). Compared to men, more women reported that discrimination based on gender had negatively impacted opportunities for their own career advancement (11.5% vs. 34.5%; $p < 0.001$). As it relates to domestic roles and responsibilities, there was no statistical significance identified between the number of hours per week each spends on tasks around the home ($p = 0.696$), but women more commonly reported holding primary responsibility for the household (12.0% vs. 49.4%; $p < 0.001$). When asked about their level of satisfaction with various aspects of life, men reported higher level of satisfaction frequently with work life (74.7% vs. 66.7%; $p = 0.042$), married life (85.5% vs. 66.7% $p < 0.001$), family life (90.1% vs. 80.5%; $p < 0.001$), and personal health (76.9% vs. 67.4%; $p < 0.001$). Compared to men, women more frequently expressed agreement with statements that work interferes with personal life (67.0% vs. 83.9%; $p = 0.003$), family life (69.7% vs. 79.3%; $p = 0.031$), personal health (66.0% vs.

77.0%; $p=0.004$), and physical condition (67.9% vs. 80.2%; $p=0.008$). Both male and female surgeons report having male mentors more frequently than females (81% vs. 5.4% for males vs. 70.1 vs. 17.2 % for females) $p=0.004$). Despite this, 72.3 percent of our surveyed population (71.4% men and 74.7% women) agreed that female role models were important for female surgeons.

Conclusions/Discussion: In our study population, no significant disparity in area of compensation was noted between male and female colon and rectal surgeons. However, female colorectal surgeons reported experiencing more discrimination based on gender during medical school, residency application process and training, fellowship application process and training; during job application; and career advancement. Female colorectal surgeons appear to derive less satisfaction from their lives, and feel that work interferes more with their daily lives. Value of mentorship and having strong female role models has been recognized by both male and female surgeons. Further research is needed into factors leading to discrimination especially during fellowship application and training years. Although each surgeon's experience is unique, developing flexible and alternate pathways and guides to achieving balance between profession and personal life in our specialty could improve satisfaction for an expanding female workforce.

WHAT IS THE IMPACT OF NATIONAL COLORECTAL CANCER AWARENESS MONTH ON COLONOSCOPY SCREENING RATES AND PUBLIC INTEREST IN COLORECTAL CANCER?

W16

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Purpose/Background: National Colorectal Cancer Awareness Month was established in the year 2000 to promote awareness and early detection of colorectal cancer in the month of March. Since that time each March a number of organizations including the American Society of Colon and Rectal Surgeons promote colorectal cancer awareness through patient education, community outreach, and social media campaigns. The impact of this health awareness campaign is unknown. In this study we examined rates of colorectal cancer endoscopic screening and public interest in colorectal cancer to determine the impact of National Colorectal Cancer Awareness Month.

Methods/Interventions: To examine rates of colorectal cancer endoscopic screening we queried colonoscopy and sigmoidoscopy rates from the Clinical Outcome Research Initiative of the National Endoscopy Database, a consortium of endoscopy practices affiliated with the American Society for Gastrointestinal Endoscopy across all regions of the United States from January 2002 through December

2014. First, we extracted all screening and diagnostic colonoscopies and sigmoidoscopies by month and developed a ratio of colonoscopies and sigmoidoscopies per endoscopist. In addition, we calculated procedures performed for indication of screening by endoscopist per month. To determine public interest in colorectal cancer screening, we employed Google Trends search data for terms "colorectal cancer", "colorectal screening", "anal cancer", and "bowel cancer" for all months starting in January 2004 through June 2018 in the United States, Canada, United Kingdom, Australia, and Worldwide. We used the forecasting procedure to identify and predict repetitive patterns in monthly rates of screening colorectal cancer screening procedures and Google search engine patterns.

Results/Outcome(s): We reviewed a total 1,398,996 lower endoscopy procedures from the National Endoscopy Database. In aggregate, 94% were colonoscopies and 6% sigmoidoscopies, with 47% performed to screen for colorectal cancer. Over the study period, a mean of 31 +/-5 lower endoscopies were performed per endoscopist per month. There was no increase in total screening procedures in March or April. In addition, the forecasting function identified no evidence of seasonal variation in screening procedures. Google Trends data demonstrated a significant increase in searches for colorectal cancer but not anal cancer in the month of March as compared to the summer months, 58% increased in the United States, 89% increase in Canada, 110% increase in Australia, 54% increase in worldwide searches, but no effect in the United Kingdom. The forecast function demonstrated seasonality in March for Google search trends in all countries except the United Kingdom.

Conclusions/Discussion: National Colorectal Cancer Awareness month is associated with an increased public interest in colorectal cancer based on user Google search trends. Yet, this interest has not translated into a demonstrable seasonal increase in the rates of colorectal cancer screening procedures in the United States. The lack of any observable screening effect for Colorectal Cancer Awareness Month demonstrates substantial challenges in increasing compliance with colorectal cancer screening recommendations.

TRAINEE PARTICIPATION IN SCREENING COLONOSCOPIES: HOW DOES IT IMPACT QUALITY?

W17

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Purpose/Background: Performing colonoscopies is an integral component of colorectal surgery residency training. Trainee effect on colonoscopy quality metrics have focused on general surgery and gastroenterology resident trainees, while there is a paucity of literature for colorectal trainees.

We hypothesized that screening colonoscopies performed with colorectal surgery resident participation would take longer to complete but still meet or exceed national quality benchmarks. The aim of this study was to investigate the effect of colorectal surgery resident participation on quality parameters in screening colonoscopy.

Methods/Interventions: Screening colonoscopies performed at a tertiary level hospital between July 2016 and September 2018 were queried from a prospectively maintained institutional colonoscopy database. Quality parameters including overall adenoma detection rate (ADR), gender-specific ADR, insertion time, total examination time, cecal intubation rate, withdrawal time, procedural complications, and medication use and dosage were compared between colonoscopies performed with trainee participation to those without trainee participation. Univariate analyses were conducted using ANOVA, Kruskal-Wallis or Pearson's chi-square test as appropriate. A multivariable logistic regression model was used in adenoma positive patients to assess the impact of trainee involvement on ADR.

Results/Outcome(s): A total of 4,594 patients were included in the study (mean age 60.5 ± 8.4 ; 51.7% female). Colonoscopies were performed by fifteen colorectal surgeons with participation by eight colorectal surgery residents. Overall, 4,186 of the colonoscopies were performed without trainee participation, and 408 were performed with trainee participation. A detailed comparison between the groups is listed in the Table. Scope insertion and withdrawal times were longer as well as total examination time in the trainee group. Cecal intubation rates, gender-specific and overall ADR, polypectomy and complication rates were similar between the groups. In the multivariate model, trainee involvement had no significant impact on ADR. When colonoscopies were compared for medications used, meperidine and midazolam doses were similar

between the groups, while the trainee group utilized a significantly higher mean dose of fentanyl.

Conclusions/Discussion: Colorectal surgery resident participation in screening colonoscopy takes significantly longer, uses a higher dosage of fentanyl and appears safe. Trainee involvement in screening colonoscopy achieves all of the appropriate national quality metrics without compromising ADR.

PRELIMINARY VALIDITY EVIDENCE FOR A NOVEL TATME TRANSANAL ENDOSCOPIC PURSE STRING SIMULATOR.

W18

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Purpose/Background: Transanal total mesorectal excision (TATME) is a new approach for mid- and low-rectal cancer. One of first critical steps of TATME is endoscopic placement of the rectal purse string, the quality of which can affect the outcome of the procedure. Suturing in a confined space is technically challenging however, and improper placement of the purse string is common. Deliberate practice in low-fidelity simulators has been shown to improve technical skill for other procedures, but such a simulator has not been developed for the purse string placement task. We therefore developed and tested a low cost, low fidelity transanal endoscopic purse string simulator and provided preliminary validity evidence for its use.

Methods/Interventions: The simulator was constructed from widely-available commercial materials (see Figure 1). A plastic box with circular cut outs was used to house a 2.5-in cardboard mailing tube which was lined with a yoga mat to simulate endopelvic fascia. The rectum was simulated

W17 Table. Demographics and Metrics by Trainee Participation

	Total (N=4,594)	No Trainee (N=4,186)	Trainee (N=408)	p-value
Age	60.5 ± 8.4	60.5 ± 8.4	60.6 ± 8.3	0.83
Gender (Female)	2,370 (51.7)	2,077 (51.9)	293 (49.8)	0.40
Withdrawal Time (minutes)	10 [7, 13]	9 [7, 13]	12 [9, 15]	<0.001
Total Scope Time (minutes)	20 [15, 27]	20 [15, 25]	28 [22, 37]	<0.001
Cecal intubation (Yes)	4,514 (98.3)	4,113 (98.3)	401 (98.3)	0.95
Adenoma detection rate	1,411 (30.7)	1,275 (30.5)	136 (33.3)	0.23
Adenoma detection rate (Female)	610 (25.7)	559 (25.8)	51 (25.1)	0.83
Adenoma detection rate (Male)	799 (36.1)	714 (35.6)	85 (41.5)	0.095
Complications	13 (0.28)	12 (0.29)	1 (0.25)	0.88
Meperidine Dose (mg)	56.5 ± 15.6	56.4 ± 15.5	75 ± 35.4	0.092
Fentanyl Dose (mcg)	87.7 ± 32.1	86.8 ± 32.6	94.7 ± 27.4	<0.001
Midazolam Dose (mg)	3.9 ± 1.3	3.9 ± 1.3	4 ± 1.2	0.05

Statistics presented as Mean ± SD, Median [P25, P75], Median (min, max) or N (column %).

using a piece of felt fabric sewn as a tube and invaginated upon itself to represent the multiple visceral layers. A cotton ball representing the tumour was sewn 8 cm from the distal end. The transanal single access port was simulated by a circular sponge fitted with a 12 mm and 5 mm laparoscopic trocar and a high-definition flexible wire camera triangulated at 4 cm intervals. The cost of all materials needed to construct one box is estimated to be \$50 USD. A curved tip laparoscopic needle driver along with a Maryland dissector was used along with a monofilament 0- polypropylene on a MO-6 needle for the task. Study subjects included general surgery residents at all levels of training, fellows enrolled in minimally invasive surgery (MIS), colorectal (CR) or surgical oncology (SO) fellowships, and staff surgeons with an intestinal tract practice focus. Subjects were recruited from university-affiliated institutions across Canada. Baseline demographic data and experience with TATME and laparoscopic suturing were recorded. Participants were instructed to endoscopically place a purse string with no gaps 1-2cm distal to the simulated tumour. If unfamiliar with the task, participants were shown a demonstration video. Performance was timed and video recorded for analysis. Technical skill was assessed by a blinded member of the research team using the modified Objective Structured Assessment of Technical Skills (mOSATS) global rating scale modified to include the 5 domains relevant to technical skills assessment (maximum score: 25). An exit survey regarding participants opinions of the simulator was scored on a 5-point Likert scale with scores ≥ 4 considered strong responses. Participants were grouped into three groups: fellows and staff with or without regular laparoscopic suturing in their practice (LAPS+ and LAPS-) and residents. A subgroup analysis was performed amongst the staff based on their previous TATME experience (TATME+, if ≥ 11 previous TATME; and TATME-, if ≤ 10 previous TATME). Comparisons between continuous variables were performed using Student's *t*-test. Results are presented as mean (standard deviation) with $p < 0.05$ taken to be significant.

Results/Outcome(s): A total of 38 participants were included of which 18 met criteria for LAPS+ (5 fellows, 13 staff: 8 colorectal, 1 surgical oncology, 4 MIS). Of 18 practicing surgeons in the entire cohort, 8 (44%) were TATME+, 13 (72%) were LAPS+ and 6 (33%) met criteria for both. Time to completion (LAPS+ 5.0 ± 1.4 min vs. LAPS- 6.5 ± 3.3 min vs. residents 9.0 ± 4.8 min, $p = 0.008$) and mOSATS scores (LAPS+ 23.9 ± 1.0 vs LAPS- 20.9 ± 2.1 vs residents 13.0 ± 5.1 , $p < 0.001$) varied significantly according to laparoscopic suturing experience. No significant difference was observed for time to completion (TATME+ 5.8 ± 3.6 vs TATME- 5.7 ± 1.7 , $p = 0.97$) or mOSATS (TATME+ 23.8 ± 1.6 vs TATME- 21.9 ± 2.6 , $p = 0.09$) by TATME experience level amongst staff. The majority of participants who had previously seen or performed at least one TATME strongly agreed the simulator accurately recreate the visual and spatial orientation of the real task (mean Likert score 4.2 ± 0.4), was useful for

skill development (4.7 ± 0.5) and should be used for proficiency testing (4.1 ± 0.7).

Conclusions/Discussion: This study describes the successful development of a low cost, low fidelity, transanal endoscopic rectal purse string simulator for TATME. Preliminary data suggest the task can accurately differentiate between practitioners with advanced versus novice laparoscopic suturing skills and is highly rated by surgeons familiar with TATME. Further testing is necessary to confirm the usefulness of this device for purse string skill acquisition and assessment.

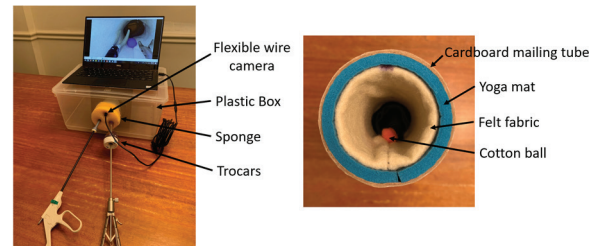


Figure 1. Materials used to create simulator

COLON AND RECTAL SURGERY ROBOTIC TRAINING PROGRAMS: AN EVALUATION OF GENDER DISPARITIES.

W19

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Purpose/Background: This study is a retrospective cohort study of the APDCRS robotic case log, a prospectively maintained database. Trainees were enrolled in either ACGME-accredited colon and rectal surgery residency or a Fellowship Council minimally invasive colon and rectal surgery program. The database covers the experience over the course of two academic years (2016-17 and 2017-18). For each case the trainee recorded the date, operation, attending, program, and recorded each step of the procedure they completed (these are based on validated steps from SAGES). After recording all of this information, each trainee then recorded the percentage of time spent on the console based on the steps they had completed. All of this data was entered into the database. Gender for each resident and attending physician was recorded retrospectively. Gender of attending and resident teams were separated into four groups: Female resident and female attending, female resident and male attending, male resident and female attending, and male resident and male attending. Case volume and average console time per case for each team combination was evaluated for significance with an interaction regression analysis using the statistical program R.

Methods/Interventions: This study is a retrospective cohort study of the APDCRS robotic case log of 3158 cases. The trainees were enrolled in either ACGME-accredited colon and rectal surgery residency or a Fellowship Council

minimally invasive colon and rectal surgery program which was participating in the APDCRS robotic curriculum. The database covers the experience over the course of two academic years (2016-17 and 2017-18). For each case the trainee recorded the date, operation, attending, program, and recorded each step of the procedure they completed (these are based on validated steps from SAGES). After recording all of this information, each trainee then recorded the percentage of time spent on the console based on the steps they had completed. All of this data was entered into the database. Gender for each resident and attending physician was recorded retrospectively.

Results/Outcome(s): A total of 52 training programs participated in the APDCRS robotics program over the course of the 2016-17 and 2017-18 academic years. These programs include 120 trainees and 203 attending surgeons. Forty-five (37.5%) of the trainees were women and 37 (18.6%) attendings were women. Female trainees performed an average of 39 cases per year (median = 35) while male trainees performed an average of 50 robotic cases per year (median = 42). The average percentage of console time was 53.5% for women and 61.7% for men ($p < 0.001$). A subgroup analysis of surgical teams with the four permutations of gender pairings was performed. This revealed the console percentage time as described by the table below. An interaction regression analysis showed there to be a significant decrease in percentage console time of female trainees when they were working with male attendings as compared to female attendings ($p < 0.001$). However, the male trainee console percentage does not change significantly based on the gender of their attending ($p = 0.6$).

Conclusions/Discussion: With a statistically significant decrease in console time, it appears there is a gender disparity in the console time allotted to female trainees. This is a concerning trend which should both be evaluated further and highlighted to alleviate the disparity. By acknowledging the potential for implicit bias, male attendings can increase the equitability of console time. Additional objective evaluations will help to further elucidate the specific changes in training based upon gender and can become a metric to evaluate for improved equality. With an increasing proportion of women in the field of colon and rectal surgery, this disparity can perhaps be partially addressed. It is important that as the number of women increases in the field, it is critical that women are well trained colon and rectal surgeons.

W19 Average Console Time per Case by Gender of Trainee-Attending Team

	Female Attending	Male Attending
Female resident	61.8%	52.1%
Male resident	63.3%	61.2%

DEVELOPMENT OF A NOVEL CURRICULUM FOR TACHING COLONIC ENDOSCOPIC SUBMUCOSAL DISSECTION (CESD): LEVERAGING THE POWER OF EDUCATION SCIENCE.

W20

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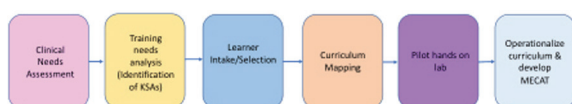
Purpose/Background: Using ESD to resect large benign and early-stage malignant colonic neoplasms has become the preferred treatment modality in parts of the world. The technique provides an en bloc resection with more accurate pathologic staging and lower local recurrence. Adoption of cESD in the West, however, has been limited given technical demands, risks of complications, and no readily available safe clinical construct for rehearsal (e.g. In Japan, mastering gastric ESD is a pre-requisite to learning the more difficult cESD). As a result, there is a need to develop an effective cESD training program that will enable practicing endoscopists to safely adopt the technique. The aim of this study was to develop such a program using best practices in education science.

Methods/Interventions: Eighteen subject matter experts (SME) with relevant clinical and educational expertise (8 clinical; 10 nonclinical) were engaged across all domains of the curriculum development process (Figure). This began with an expert panel participating in a Clinical Needs Assessment that included a literature review of the utility of cESD versus endoscopic mucosal resection (cEMR) or surgery, a market analysis, and identification of barriers to procedural adoption. The output from this panel was used as justification to invest in developing the full curriculum. Next, a Training Needs Analysis was conducted to identify the knowledge, skills, and attitudes (KSAs) required to perform cESD. SMEs participating in a novel 3-day curriculum development symposium delineated KSAs which were used to develop more specific learning objectives (cognitive, psychomotor, and affective). These objectives were incorporated into a curriculum map and linked to the development of course modules. To define desired learner characteristics, indications/contraindications for cESD, and procedural steps, a two-stage modified Delphi process was used. Based on review of the literature and expertise in training for procedural adoption, education SMEs developed an initial list of desired learner characteristics, indications/contraindications for cESD, and proposed procedural steps. These were sent via electronic survey to the clinical SMEs with options to 'keep', 'modify' or 'delete' each item in the survey, and to provide rationale if modifying/deleting an item. The anonymized survey results were then discussed in person and output used to define enrollment criteria, case selection, and a deconstructed

task list focused on enabling novices to successfully adopt the procedure. To optimize the procedural training portion of the curriculum, a hands-on lab was piloted using novel custom-built ESD models and the deconstructed task list. Clinical SMEs taught novices who met enrollment criteria how to perform three different methods of cESD. Feedback was collected and used to solidify the hands-on laboratory plan. Finally, a clinical assessment tool (MECAT – MITIE ESD Competency Assessment Tool) was created to assess technical performance of cESD for the purposes of formative and summative feedback.

Results/Outcome(s): After the TNA was conducted, SMEs split the course into three modules: pre-, intra-, and post-procedure. The content and teaching methods for each were defined and resources/materials identified. The modified Delphi technique reached consensus on learner selection, lesion selection, and procedural steps. Agreed upon enrollment criteria were: (1) in practice >2yrs, (2) board certified in Gastroenterology/Surgery & privileged in cEMR, (3) available case volume $\geq 25/\text{yr}$, (4) video submission of cEMR performed by learner, (5) letter of support from department chair or CEO, (6) clearly identified team members, and (7) course payment by learner (up to \$5,000). Lesions suitable for cESD were: Clinical T1N0M0, Paris 0-IIa + 1s >2cm, 0-IIc + IIa, 0-IIc, laterally spreading tumors (LST) - granular >30mm, non-granular >20mm, any location, ability to achieve en bloc resection. Three techniques for performing cESD were identified: standard, pocket method and 'enabling technology'. A comprehensive task list for each technique was developed. Feedback from the hands-on lab directed modification of the planned curriculum based on learners themes. For example, learners felt the cESD model functioned well but that the use of adjuncts were enabling only later in their learning curve. The MECAT was modified based on SME review and designed to capture performance of individual cESD steps as well as overall performance in scope/tool management and use of energy.

Conclusions/Discussion: We describe the development of a comprehensive cESD training curriculum using best practices in educational science. It will be used for rolling out nation-wide training in the US, followed by expansion worldwide. Future work will add mentoring and video coaching to the curriculum, assess outcomes, and collect validity evidence for use of the MECAT.



Evidence based development of a novel cESD curriculum

PRECLINICAL TO CLINICAL LEARNING CURVE EXPERIENCE - ADVANCED SKILLS ACQUISITION OF ENDOLUMINAL FLEXIBLE ARTICULATING SURGICAL PLATFORM.

W21

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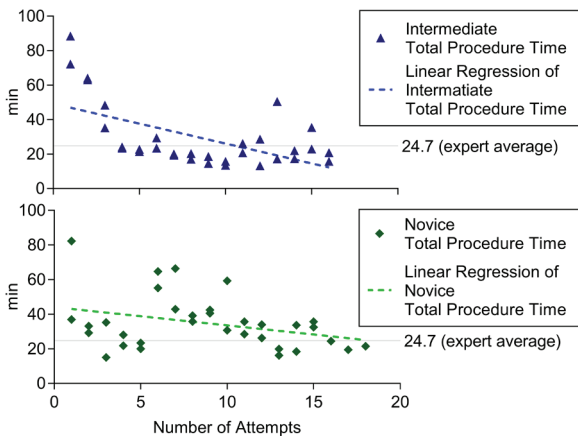
Purpose/Background: Although appropriate endoscopic treatment options are available, more than 25,000 colectomies for benign conditions are performed each year in the United States. This may be due, in part, to the associated technical challenges in endoscopic submucosal dissection (ESD) and complex EMR. ESD requires a high skill level and is only achieved through time-intensive training. To overcome the challenges with using endoscopy with its many limitations, we developed a novel flexible articulating platform for endoluminal surgical procedures. Here we show the preclinical experience and learning curve with this technology.

Methods/Interventions: Flexible articulating 5mm diameter grasper/scissors and an endoscopic double balloon overtube with two additional channels which permit tool passage to the area of interest and were cleared by the Food and Drug Administration (August 2018). The distal end of the grasper/scissors can be articulated by the thumb-operated knob positioned at the handle. The device tip can rotulate, orient the shaft and open/close the jaws for grasping or cutting tissue. The scissors are also monopolar electro-surgery enabled. This novel platform was validated by performing lesion resections in ex-vivo colon model first, then an in-vivo live animal model. Fresh porcine distal colon was used in the ex-vivo model and circa 55kg Yorkshire pigs were used in the in-vivo model. In the in-vivo model, our primary goal was to evaluate coagulation capabilities. The lesion border was marked onto the mucosal surface by electrocautery. The lesion size was set as 2.5 cm in diameter in the ex-vivo model. Six operators participated in this study: The two of the six, as experts (Es), i.e., significant clinical endoscopy experience and involved in the development of these devices; Another two, as intermediates (Is), i.e., the significant clinical endoscopy experience but not involved in the development of these devices; The last two, as novices (Ns), i.e., no clinical endoscopy experiences and not involved in the development of these devices. Procedure completion, perforation, and total procedure time (minutes) were collected prospectively as the surrogates of feasibility and skill acquisition. The average total procedure time of the last 5 attempts of intermediate group and novice group were compared with the average of whole expert total procedure time by t-test.

Results/Outcome(s): In total 103 procedures were performed. 85 ex-vivo and 18 in-vivo, respectively. The ex-vivo procedure completion rate was 99% (84/85) and 100% (18/18) within the in-vivo. The ex-vivo perforation

rate was 1% (1/85) and 6% (1/18) in-vivo. The linear regression of each expertise group was analyzed (see Figure 1) and showed decreasing trends by the number of attempts. Both linear regressions of intermediate and novice group reached the expert average (24.7 minutes) by the end of the training period. The average total procedure time of the last 5 attempts of the intermediate group was 24.4 minutes and that of the novice group was 27.5 minutes. There was no significant difference of the non-expert groups compared to the expert group ($p=0.9417$ and $p=0.4515$, respectively).

Conclusions/Discussion: The procedural completion rate and perforation rate were within acceptable limits for this novel platform in both the ex-vivo and the in-vivo models. The skills gained in the ex-vivo procedures were directly transferrable to the in-vivo setting. Within a defined period, novice and intermediate trainees acquired a similar skill set to the experts, indicating that the requisite skill was acquired with appropriate training. A combination of ex-vivo and in-vivo approach may provide the clinicians with an appropriate degree of confidence to embark on clinical cases. The first clinical case using this platform was completed in early October 2018. We are planning to expand this human case study under IRB approval in the coming months.



CONDITIONAL SURVIVAL AFTER ILEAL POUCH-ANAL ANASTOMOSIS: DOES LONG-TERM POUCH SURVIVAL IMPROVE WITH TIME?

W26

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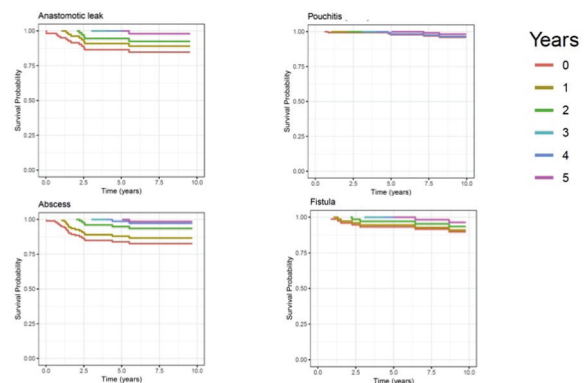
Purpose/Background: The risk of pouch failure following ileal pouch-anal anastomosis (IPAA) for inflammatory bowel disease may not have a linear relationship with pouch loss over time, such that if a pouch survives the first several years, long-term pouch survival may actually improve. Conditional survival is a method to describe

these non-linear time-to-event relationships by reporting the expected survival at various time points. This method has not previously been applied to IPAA survival. The aim of this study was to calculate conditional pouch survival based on occurrence of risk factors for pouch loss. We hypothesize that long-term pouch survival improves over time.

Methods/Interventions: A prospectively maintained database was queried for all patients who underwent index IPAA construction at our institution from 1986 to 2016 for ulcerative or indeterminate colitis. Patients with Crohn’s disease were excluded. Patients were stratified based on the occurrence of known risk factors for pouch failure including post-operative anastomotic leak, abscess, pouchitis, fistula, and pouch configuration. The Kaplan Meier method was used to estimate overall and cause-specific pouch survival at 10-years (based on median follow-up). Conditional survival estimates were used to evaluate the probability of the pouch surviving an additional number of years given the number of years already survived.

Results/Outcome(s): A total of 3,468 patients underwent IPAA during the study period, with a median follow-up of 7.9 years (95% CI 7.24 - 8.15). The overall 10-year pouch survival rate was 0.94 (0.93 – 0.95). A total of 122 (3.5%) patients developed anastomotic dehiscence and the overall 10-year IPAA survival for this group was 0.85 (95% CI 0.77 - 0.93). After 1-year of pouch survival, the conditional pouch survival increased to 0.89 (95% CI 0.82 - 0.96), after 2-years to 0.93 (95% CI 0.86 - 0.99), after 3-years to 0.98 (95% CI 0.94 - 1), and after 5-years to 0.98 (95%CI 0.94 - 1). A similar pattern was seen for IPAA with postoperative abscess but no confirmed anastomotic dehiscence (n=188, 5.4%). Conversely, there was no change in conditional survival over time for IPAA with pouchitis (n=150, 4.3%), fistula (n=87, 2.5%), J-pouch (n=3152, 91%) or S-pouch (n=308, 8.8%). Conditional survival curves are shown in Figure 1.

Conclusions/Discussion: Overcoming pelvic sepsis without pouch failure leads to long-term pouch survival. Conversely, the risk of pouch failure due to pouchitis, fistula, or configuration remains stable over time. These novel findings can be useful to counsel patients regarding expectations for long-term pouch survival.



CLINICAL AND GENETIC FACTORS ASSOCIATED WITH COMPLICATIONS AFTER CROHN'S ILEOCOLECTOMY.

W27

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Purpose/Background: There have been no studies evaluating complications after Crohn's Disease (CD) ileocelectomy as a function of both clinical and genetic factors. In this study we evaluated preoperative, operative, laboratory factors, and certain genetic polymorphisms to attempt to identify those associated with postoperative complications after Crohn's ileocelectomy.

Methods/Interventions: We identified 269 patients with CD who had undergone 287 ileocelectomies at our institution between July 2008 and October 2018. These patients had been prospectively recruited into our Colorectal Diseases Biobank and had DNA available to study. A retrospective chart review was performed to gather characteristics of these patients including sex, race, age, ASA status, BMI and smoking status at surgery, indication for surgery, whether surgery was open, laparoscopic, or converted, emergent, urgent, or elective, whether diverting ostomy was performed, length of stay after surgery (LOS), and postoperative complications. Complications were categorized using the Clavien-Dindo scale. Preoperative use of biologics, immunomodulators, prednisone, and intravenous steroids during hospitalization were also evaluated. White blood cell count (WBC) and albumin (before surgery) were recorded as well as the change in hematocrit from before surgery to after (Δ Hct). For genetic analysis, DNA was isolated from the samples and a Taqman assay was used to evaluate the genotype of six single nucleotide polymorphisms (SNPs): rs2066844, rs2066845, and rs2076756 in *NOD2*, rs4958847 and rs13361189 in *IRGM*, and rs2241880 in *ATG16L1*. These SNPs in *NOD2*, *IRGM*, and *ATG16L1* were chosen for study due to their previously established association with Crohn's disease. The statistical program R with package compareGroups was used to perform univariate analyses. Nonparametric tests were used when indicated. Multivariate analysis was then performed to identify independent factors associated with complications.

Results/Outcome(s): There were 86 ileocelectomies out of 287 (30%) which resulted in complications requiring intervention. Of these, 66 required medical management alone, 11 required surgical or radiologic intervention, and 9 required an upgrade in care. There were no postoperative deaths. The top complications were surgical site infection (19/86, 22%), prolonged ileus (15/86, 17%), and intra-abdominal abscess (10/86, 12%). The overall median LOS after ileocelectomy was 5 days. The attached table compares factors between the no complication (NC) group and the complication (C) group. Significant

factors associated with complication after ileocelectomy by multifactorial analysis were A) open surgery, B) placement of diverting ostomy, C) a greater perioperative decrease in hematocrit, and D) SNP rs13361189 in the gene *IRGM1*. There were 61 patients with a variant at the rs13361189 SNP and 26 of them (43%) had complications. Interestingly, there was no association between preoperative immunosuppressive medications and postoperative complications.

Conclusions/Discussion: This study found 3 clinical factors and 1 genetic SNP associated with complications after ileocelectomy for CD. The placement of a diverting stoma was associated with complications, independent of other factors including the presence of fistula, abscess, or perforating disease, and thus calls into question its therapeutic value in CD ileocelectomies. Open surgery and increased intraoperative blood loss were also associated with postoperative complications. Finally, the rs13361189 SNP in the *IRGM* gene was independently associated with complications after ileocelectomy for CD. *IRGM* is a molecule involved in cellular autophagy and has previously been associated with increased CD recurrence after surgery. This study is the first to evaluate in a multivariate way both genetic and clinical factors associated with postoperative complications after ileocelectomy. Uniquely, the association of *IRGM* with increased complications, is in addition to a previous association with increased disease recurrence after ileocelectomy, suggesting that mutations in this gene are associated with a more severe phenotype of Crohn's disease. Such genetic factors may one day play a role in surgical decision making.

COST-BENEFIT LIMITATIONS OF EXTENDED VENOTHROMBOEMBOLISM PROPHYLAXIS FOLLOWING SURGERY FOR CROHN'S DISEASE.

W28

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Purpose/Background: Inflammatory bowel disease patients are at increased risk of postoperative venothromboembolism (VTE). Historically, extended outpatient prophylaxis (ePpx) has been criticized for not meeting conventional measures of societal cost-benefit advantage given the low event rate of postoperative VTE and high cost of therapy. ePpx for Crohn's disease (CD) patients (increased VTE risk plus early age of onset with long life expectancy) may be more cost-effective than in other populations. The purpose of this study was to assess the cost-effectiveness of ePpx in postoperative CD patients.

Methods/Interventions: We constructed a decision analytic model to compare costs and outcomes in postoperative CD patients with and without ePpx (low-molecular weight heparin for 4 weeks after surgery) over a lifetime time horizon. The reference risk of post-discharge VTE in

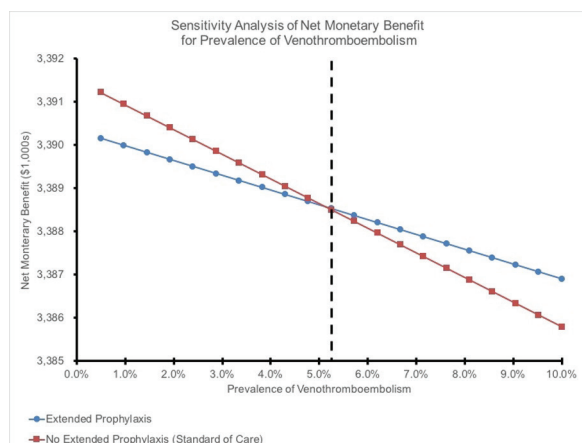
W27

	No Complications n=201	Complications N=86	Univariate analysis p-value	Multivariate analysis p-value
Male	90 (44.8%)	39 (45.3%)	1	0.6
Caucasian	188 (93.5%)	80 (93.0%)	1	0.7
Age at surgery (mean +/- SE)	37.1 +/- 1.0	39.7 +/- 1.0	0.2	0.5
Smoking at surgery	48 (23.9%)	23 (26.7%)	0.7	0.9
Indication	-	-	0.7	0.3
Abscess	25 (12.4%)	15 (17.4%)		
Fistula	32 (15.9%)	11 (12.8%)		
Nonresponsive	37 (18.4%)	12 (14.0%)		
Obstruction	100 (49.8%)	44 (51.2%)		
Perforation	7 (3.5%)	4 (4.7%)		
Type of surgery	-	-	0.0015*	0.020*
Laparoscopic	109 (54.2%)	27 (31.4%)		
Lap converted	16 (7.96%)	8 (9.30%)		
Open	76 (37.8%)	51 (59.3%)		
Diverting stoma	33 (16.4%)	32 (37.2%)	< 0.001	0.0021*
Timing of surgery	-	-	0.5	0.5
Elective	171 (85.1%)	69 (80.2%)		
Emergent	5 (2.5%)	3 (3.5%)		
Urgent	25 (12.4%)	14 (16.3%)		
ASA status	-	-	0.5	0.9
Class 2	113 (56.2%)	45 (52.3%)		
Class 3	85 (42.3%)	41 (47.7%)		
Class 4	3 (1.5%)	0 (0%)		
BMI (mean +/- SE)	25.7 +/- 0.5	25.7 +/- 0.5	0.9	0.8
Immunomodulators	49 (24.4%)	22 (25.6%)	0.9	0.8
Biologics	105 (52.2%)	41 (47.7%)	0.6	0.3
Prednisone	96 (47.8%)	45 (52.3%)	0.6	0.7
IV Steroids	50 (24.9%)	25 (29.1%)	0.6	0.4
WBC (mean +/- SE)	8.7 +/- 0.2	9.5 +/- 0.3	0.2	0.9
Δ Hct (mean +/- SE)	-4.2 +/- 0.2	-5.2 +/- 0.3	0.06	0.022*
Albumin (mean +/- SE)	3.8 +/- 0.04	3.8 +/- 0.05	0.6	0.6
Length of Stay (mean +/- SE)	-	-	< 0.001*	N/A
(days, median)	4	7		
NOD2 SNPs	-	-	-	-
rs2066845 variants	17 (9.9%)	4 (5.9%)	0.5	0.6
rs2076756 variants	123 (64.8%)	54 (69.3%)	0.7	0.6
rs2066844 variants	43 (23.1%)	19 (25.0%)	0.9	0.2
IRGM SNPs	IRGM SNPs	-	-	-
rs13361189 variants	rs13361189 variants	35 (18.7%)	26 (32.1%)	0.049*
rs4958847 variants	rs4958847 variants	36 (23.0%)	23 (33.8%)	0.6
ATG16L1 SNP	-	-	-	-
rs2241880 variants	116 (65.2%)	49 (65.4%)	0.3	0.1

CD was estimated from recent literature (1.1%). Age of onset of surgical CD, VTE event rate, effect of ePpx on VTE event rate, re-bleeding, and mortality were estimated using existing public sources. Productivity costs (\$) and benefits (quality-adjusted life year, QALY) were used to reflect a societal perspective and were time-discounted at 3%. Probabilistic sensitivity analysis accounted for uncertainty in probabilities, costs, and utility weights.

Results/Outcome(s): Using reference parameters, we calculated the per individual expected societal total cost of care to be \$397.89 in the routine care group and \$1,387.09 with ePpx. Preventing a single VTE mortality with widespread use of ePpx with surgery for Crohn's disease would cost \$43.00 million. The incremental cost per quality-adjusted life year (ICER) was \$2.37 million per life year versus a generous willingness-to-pay threshold per life year of \$150,000. All conclusions were upheld under the complete range of sensitivity analyses. An extreme-case scenario found that subpopulations with VTE rates greater than 5.2% favors ePpx (Figure).

Conclusions/Discussion: CD patients are at increased risk of VTE and their long average life expectancies carry a disproportionate societal cost if a VTE event were fatal. However, the absolute low risk of VTE in any individual and the considerable cost of universal ePpx limit the balanced cost-benefit of ePpx in this population. VTE event rates would need to be 5 times greater than current reports for ePpx to be justified. Further investigation is needed to determine if specific extreme-high risk individuals can be preemptively identified in the general CD surgical population for targeted ePpx.



Demonstration of net monetary benefit (cost per QALY minus willingness to pay) across a range of hypothetical venothromboembolic event prevalence for two strategies (with and without extended prophylaxis). A greater net monetary benefit for a given prevalence is the preferred strategy from a cost-effectiveness approach. Dashed line represents inflection point of preferred strategy at a prevalence of 5.2%

THE IDEAL ILEAL POUCH: THE SIGNIFICANCE OF ILEAL POUCH PHYSIOLOGIC PARAMETERS (POUCH COMPLIANCE/DISTENSIBILITY AND POUCH ANAL PRESSURE GRADIENTS) ON POUCH FUNCTION.

W29

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Purpose/Background: Ideal ileal pouch function following ileal pouch anal anastomosis (IPAA) is determined by a variety of factors. These factors include physiologic parameters such as ileal pouch compliance/distensibility (IPC), and intra-pouch to anal pressure (PAP) gradients. The impact of these parameters on optimization of ileal pouch function have not been well investigated. Ileal pouch function and continence scores likely depend less on the ileal pouch configuration (S vs J), than on maintaining consistent physiologic properties (IPC, PAP gradients) that ultimately determine functional outcome. This study examines specific post IPAA physiologic parameters and their impact on ileal pouch function.

Methods/Interventions: All study patients included had an S type IPAA performed for ulcerative colitis. Post IPAA physiologic assessment including manometry, compliance, and pouch anal pressure gradient was obtained at 6 months post op along with an assessment of pouch function. Compliance was calculated as change in volume divided by the change in pressure ($\Delta V/\Delta P$). These values were measured using a previously reported methodology with a specially designed double-lumen catheter that allowed for continuous saline infusion and simultaneous intra-reservoir pressure monitoring. Pouch anal pressure (PAP) gradient was calculated as the difference between resting anal pressure and intra-pouch pressure. Primary end-points of pouch function included number of 24-hour and nighttime bowel movements and day/nighttime incontinence as defined on a 4-point scale (0-Never, 1-Occasional, 2-Minor, 3-Major). Evaluation of association between physiologic factors of interest and measures of pouch function was performed using the Spearman Correlation Coefficient, Fisher's Exact Test and Analysis of Variance. Statistical significance was determined based on a p values <0.05 .

Results/Outcome(s): 125 patients following IPAA for ulcerative colitis were included in this study. The majority of IPAA patients were male (57.1%) with a mean age of 41 and mean BMI of 27. Mean post IPAA resting anal manometry was 58.1 mmHg. Mean volume at initial urge to evacuate was 245 ml with an average intra-pouch pressure of 33.9 mmHg. Mean pouch compliance was 11.2 mmHg/ml ranging from 4.5 to 23.5 mmHg/ml. Mean PAP gradient was 29.3 mmHg. Of the physiologic factors of interest, compliance ($p<0.05$) and PAP gradient ($p<0.05$) were found to correlate with 24hr and nighttime stool frequency. Daytime continence was impacted by

compliance ($p < 0.05$), PAP gradient ($p < 0.05$) and resting sphincter pressure ($p < 0.05$). Nighttime continence was primarily determined by PAP gradient ($p < 0.05$) and resting sphincter pressure ($p < 0.05$).

Conclusions/Discussion: This unique evaluation of ileal pouch physiology reveals a significant correlation between ileal pouch physiologic properties and overall function. Ideal function (stool frequency and continence) is in part dependent on maintaining optimal IPAA compliance and pressure differentials between the ileal pouch and anal canal.

SURGERY, STOMAS, AND DEPRESSION AND ANXIETY IN INFLAMMATORY BOWEL DISEASE - A RETROSPECTIVE COHORT ANALYSIS OF PRIVATELY INSURED PATIENTS.

W30

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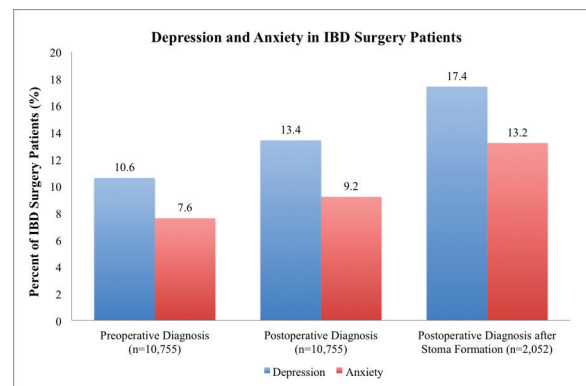
Purpose/Background: Patients with chronic illnesses, including inflammatory bowel disease (IBD), suffer from higher rates of anxiety and depression than the general population. Compared to other chronic illnesses, IBD patients commonly undergo major surgeries and experience numerous resulting stressors that may further contribute to depression and anxiety - such as financial insecurity, lost work time, high caregiver burden, and changing body image. However, the actual impact of surgery on the rates of depression and anxiety in IBD patients is unknown.

Methods/Interventions: We used a national private insurance claims database (Optum Clinformatics DataMart) to assess IBD patients, ages 6+, undergoing abdominal surgery from 2003-2016. We required continuous enrollment in an insurance plan for one year preoperatively and one year postoperatively. The outcomes of interest were depression and anxiety diagnoses (≥ 1 inpatient or ≥ 2 outpatient diagnoses on separate dates within the year before or after the index surgery). The primary independent variable was timing, specifically the year before or after surgery. A secondary analysis assessed the effect of stoma formation on the rates of depression and anxiety diagnoses. Descriptive statistics and multivariate logistic regression analyses were performed using STATA/SE 14.2.

Results/Outcome(s): We identified 10,755 IBD patients who underwent abdominal surgery and met enrollment criteria. Nearly one in five surgeries (19.1%) resulted in stoma formation. Mean [SD] age was 53[18] years, 56.8% were female, and more patients had Crohn's disease (51.7%) than ulcerative colitis (41.7%). Preoperative depression was diagnosed in 10.6% of patients and preoperative anxiety was diagnosed in 7.6%. There were no differences in rates of preoperative depression or anxiety

between Crohn's disease and ulcerative colitis patients (depression 10.2 vs. 10.8%, $p = 0.38$; anxiety 7.7 vs. 7.3%, $p = 0.44$). Preoperative diagnoses of depression and anxiety were more common among patients who underwent stoma-forming surgery as compared to those who underwent surgery not resulting in stoma formation (depression 12.5 vs. 10.1%, $p = 0.001$; anxiety 9.5 vs. 7.1%, $p < 0.001$). Postoperatively, 13.3% of patients met criteria for depression; 6.4% represented new diagnoses. Rates of anxiety also increased postoperatively to 9.2%; 4.7% were new anxiety diagnoses. Compared to those with Crohn's disease, patients with ulcerative colitis were significantly more likely to be newly diagnosed with depression (8.3 vs. 6.1%, $p < 0.001$) and anxiety (6.3 vs. 4.1%, $p < 0.001$) after surgery. Stoma-forming surgery also resulted in more new diagnoses of depression (10.0 vs. 6.5%, $p < 0.001$) and anxiety (8.0 vs. 4.5%, $p < 0.001$) compared to other abdominal surgeries. In multivariate models, stoma formation was significantly associated with new postoperative depression (OR 1.6, 95% CI 1.3-1.9, $p < 0.001$) and anxiety (OR 1.8, 95% CI 1.4-2.2, $p < 0.001$). Other risk factors for new postoperative depression or anxiety diagnoses included female gender, other comorbid conditions, and low socioeconomic status (net worth). Patients with preoperative diagnoses of depression were at higher risk for being diagnosed with postoperative anxiety (OR 2.4, 95% CI 1.9-3.0, $p < 0.001$), and those with preoperative anxiety were at higher risk for being diagnosed with postoperative depression (OR 1.9, 95% CI 1.3-2.5, $p < 0.001$).

Conclusions/Discussion: Abdominal surgery is associated with increased rates of depression and anxiety diagnoses in IBD patients. Stoma formation is an independent risk factor for developing new postoperative anxiety and depression. These results highlight the need for increased psychological support services around the time of major abdominal surgery, particularly for new ostomates.



EXPOSURE TO ANTI-TNF MEDICATIONS INCREASES THE INCIDENCE OF POUCHITIS AFTER RESTORATIVE PROCTOCOLECTOMY IN PATIENTS WITH ULCERATIVE COLITIS.

W31

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Purpose/Background: Pouchitis is the most frequent complication after ileal pouch anal anastomosis (IPAA) in patients with ulcerative colitis (UC). Antibiotics represent the mainstay of treatment, suggesting that the microbiome plays a crucial role in the pathogenesis of this condition. Anti-TNF agents have been shown to influence the gut microbiome and host immunity. The aim of this study is to assess the effect of prior exposure to biologics on the development of pouchitis in patients with UC after IPAA.

Methods/Interventions: We conducted a retrospective study of all patients with UC undergoing IPAA between January 2000 – December 2010 at a tertiary care IBD referral center. Patients diagnosed with Crohn's disease (CD) either preoperatively or on initial colectomy were excluded. Following IPAA, patients were generally seen every 3 months in pouch clinic for the first year and yearly thereafter, with pouchoscopy typically performed annually and/or based on suggestive symptoms. Pouchitis was diagnosed based on standardized clinical criteria (frequency, urgency, rectal bleeding, fever), and endoscopic findings (edema, granularity, friability, loss of vascular pattern, exudate, ulceration). Demographic, clinical, surgical, and outcome data were collected. Statistical analysis was performed by Chi-square test, Mann-Whitney U test, and logistic regression analysis using a cutoff for inclusion of $p < 0.15$.

Results/Outcome(s): Four hundred seventeen patients underwent IPAA during the study period. Six patients were excluded for a perioperative diagnosis of CD leaving a final cohort of 411 patients. The overall incidence of pouchitis was 40.4% with a median follow-up of 61 months (range 2-207 months). There were no differences in the demographics, selected patient and disease specific factors, surgical approach, and short term postoperative complications between patients who developed pouchitis compared to those that did not (Table 1). On univariate analysis, patients who had received anti-TNF agents or preoperative steroids were significantly more likely to develop pouchitis (anti-TNF: 47.9% vs 36.5%, $p = 0.027$; steroids: 41.7% vs 23.3%, $p = 0.048$). On multivariable analysis, only prior anti-TNF therapy was an independent predictor for pouchitis ($p = 0.05$). In a subgroup analysis of patients who received anti-TNF medications, none of the analyzed variables were significant protective factors for pouchitis. However, a trend towards a decreased incidence of pouchitis was observed after stapled compared to hand-sewn anastomosis (45% vs 60%, $p = 0.18$) and in patients with

shorter duration of disease at diagnosis (44 vs 53 months, $p = 0.069$). Pouchitis was not significantly associated with adverse long-term outcomes, such as development of fistulae, strictures, CD of the pouch, need for revision/diversion, or pouch failure.

Conclusions/Discussion: In a large cohort of patients undergoing IPAA for UC, anti-TNF exposure was the only independent risk factor for the development of pouchitis. These agents may "precondition" the pouch to develop pouchitis through alterations in the microbiome and/or local host immunity of the terminal ileum. Further studies are needed to elucidate the mechanism by which anti-TNF agents predispose to the development of pouchitis.

WHAT FACTORS ARE ASSOCIATED WITH THE EVENTUAL NEED FOR A PERMANENT ILEOSTOMY AFTER SPHINCTER-PRESERVING SURGERY FOR CROHN'S COLITIS?

W32

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Purpose/Background: An ileosigmoid (IS) or ileorectal (IR) anastomosis is the restorative procedure of choice for Crohn's colitis. Unfortunately, a substantial proportion of these patients later develop Crohn's proctitis necessitating a proctectomy and permanent ileostomy. The rate of subsequent proctectomy and risk factors for permanent ileostomy remain poorly understood. Therefore, the aims of this study were to 1) determine the long-term ostomy-free survival rate after IS or IR anastomosis for Crohn's colitis and 2) identify risk factors for the requirement of a permanent ileostomy.

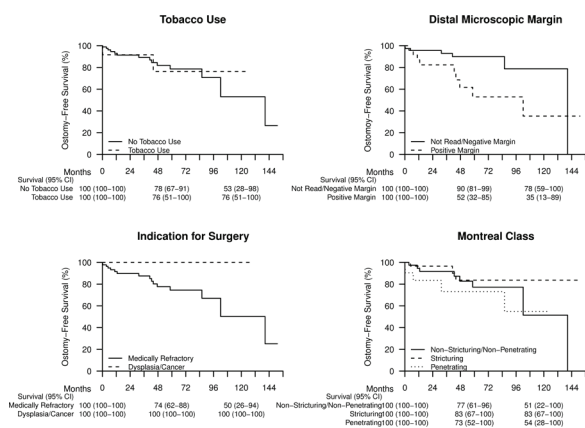
Methods/Interventions: A retrospective chart review of was conducted of all patients with CD who underwent TAC with IS or IR anastomosis between January 2006 and February 2018 at a tertiary care inflammatory bowel disease referral center. Operations were classified as either 1-stage (TAC with IS or IR anastomosis), 2-stage (TAC with IS or IR anastomosis and diverting loop ileostomy [DLI] followed by DLI reversal), modified 2-stage (TAC followed by IS or IR anastomosis at a subsequent operation), or 3-stage (TAC followed by IS or IR anastomosis with DLI and then DLI reversal). 30-day postoperative outcomes following IS or IR were collected. Univariate comparisons between the IS and IR groups were performed. Ostomy-free survival was calculated from the time of restoration of intestinal continuity to the date of indefinite stoma creation, censoring at the date of last follow-up. Kaplan-Meier survival analysis compared ostomy-free survival across different patient characteristics, and Cox-proportional hazard analysis was used to determine risk factors for permanent ileostomy.

W31 Table 1

	POUCHITIS	POUCHITIS	UNIVARIATE	MULTIVARIATE
	No N=245 (59.6%)	Yes N=166 (40.4%)	p	p
Gender	-	-	0.55	
M	146(60.8%)	94(39.2%)		
F	99(57.9%)	72(42.1%)		
Age, y (range)	36(13-66)	36(13-66)	0.307	
Smoking	-	-	0.941	
Yes	85(59.9%)	57(40.1%)		
No	160(59.5%)	109(40.5%)		
Disease duration, m (range)	56(2-464)	57(3-552)	0.567	
Indication	-	-	0.458	
Dysplasia	39(66.1%)	20(33.9%)		
Fulminant	61(61.0%)	39(39.0%)		
Refractory	145(57.5%)	107(42.5%)		
PO steroids	-	-	0.048	ns
Yes	222(58.3%)	159(41.7%)		
No	23(76.7%)	7(23.3%)		
IV steroids	-	-	0.822	
Yes	140(60.1%)	93 (39.9%)		
No	105(59.0%)	73(41.0%)		
ASA	-	-	0.078	ns
Yes	214(58.2%)	154(41.8%)		
No	31(72.1%)	12(27.9%)		
Immunomodulators	-	-	0.06	ns
Yes	149(56.2%)	149(56.2%)		
No	96(65.8%)	96(65.8%)		
Biologics	-	-	0.027	0.05
Yes	73 (52.1%)	67 (47.9%)		
No	172(63.5%)	99 (36.5%)		
TPN	-	-	0.369	
Yes	50(64.1%)	28(35.9%)		
No	195(58.6%)	138(41.4%)		
Serum albumin (g/dl)	4.3(2.4-5.1)	4.3(2.9-5.1)	0.322	
History of C. Diff	-	-	0.342	
Yes	33(54.1%)	28(45.9%)		
No	212(60.6%)	138(39.4%)		
Pancolitis	-	-	0.468	
Yes	192(60.6%)	125(39.4%)		
No	53(56.4%)	41(43.6%)		
# of stages	-	-	0.15	ns
1	33(63.5%)	19(36.5%)		
2	129(63.2%)	75(36.8%)		
3	83(53.5%)	72(46.5%)		
Anastomosis	-	-	0.34	
Hand sewn	97(62.6%)	58(37.4%)		
Stapled	148(57.8%)	108(42.2%)		
Minimally invasive	-	-	0.296	
Yes	85(56.3%)	66(43.7%)		
No	160(61.5%)	100(38.5%)		
Anastomotic Leak	-	-	0.245	
Yes	26(68.4%)	12(31.6%)		
No	219(58.7%)	154(41.3%)		

Results/Outcome(s): 109 patients (56% female) with a median age of 38 years (interquartile range [IQR], 26-50) had an IS (54%) or IR (46%) anastomosis performed, most commonly as a 1-stage procedure (47%) followed by a modified 2-stage approach (33%), with a minority performed in 2-stages (13%) or 3-stages (7%). The indication for TAC were medically refractory disease (86%) and dysplasia/cancer (14%). The overall anastomotic leak rate was 4%. Sixteen of the 109 patients had undergone either proctectomy or diversion with the rectum left *in situ* at date of last follow-up. Ostomy-free survival at 5 and 10 years was 78% (95% confidence interval [CI]: 68-90) and 58% (95% CI: 35-94), respectively. A positive microscopic distal margin in the colectomy specimen was found in 32% of cases (27% IS vs 38% IR, $p=0.23$) and was a significant risk factor for the later need for a permanent ileostomy (hazard ratio [HR]: 6.1; 95% CI, 1.9-19.6) (FIGURE). The overall median number of bowel movements per day at last follow-up was 6 (IQR, 5-10), and patients with an IS anastomosis reported fewer bowel movements per day than those with an IR anastomosis (median 5 vs 8, $p=0.16$).

Conclusions/Discussion: Long-term ostomy-free survival can be achieved in the majority of patients who undergo restoration of intestinal continuity after TAC for Crohn's colitis. A positive distal microscopic margin is independently associated with long-term anastomotic failure and should be accounted for when risk-stratifying patients for recurrence post-operatively.



Overall ostomy-free survival stratified by potential risk factors for long-term anastomotic failure including current tobacco use, distal microscopic margin status, the indication for surgery, and the Montreal classification. Log rank p -value < 0.05 for distal microscopic margin; log rank $p > 0.05$ for other Kaplan-Meier curves.

PRE-OPERATIVE OPIOID USE PREDICTS MAJOR COMPLICATIONS IN CROHN'S PATIENTS UNDERGOING ELECTIVE ILEOCOLIC RESECTION.

W33

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Purpose/Background: Societal opioid use has grown exponentially over the last decade. Prior studies have demonstrated the morbidity and mortality associated with immunomodulatory therapy in patients with Crohn's disease (CD), but the effect of pre-operative opioid use in patients with CD undergoing surgery is not known. The aim of this study is to identify whether pre-operative opioid use is associated with adverse post-operative outcomes in CD patients undergoing elective ileocolic resection.

Methods/Interventions: In order to standardize the type of surgery, consecutive CD patients undergoing elective ileocolic resection from 2014-2018 were included. Demographic and operative details were extracted from patient charts. Details of pre-operative opioid use (POU) over the 12-month period preceding surgery were collected from "Kentucky All Schedule Prescription Electronic Reporting" as well as bordering state systems, when applicable. POU was converted to morphine milligram equivalents (MME). A multivariable binary logistic regression model was used to identify associations between POU and major post-operative complications and 30-day hospital readmissions. A multivariable linear regression model was used to identify predictors of increased length of hospital admission.

Results/Outcome(s): Forty-three of 100 patients (43%) used opioids within 6 months prior to surgery (Range 0 to 33,760 MME.) The differences between patients with POU as compared to those without POU were; 1) a higher pre-operative white blood cell count ($p=0.007$), 2) a requirement for an ostomy at surgery ($p=0.077$), 3) ileocolonic disease (Montreal L3, $p=0.093$), and 4) older age at diagnosis (Montreal A3, $p=0.095$). Patients with POU required more opioids per day during their hospital admission ($p=0.024$). Fourteen patients (POU: 31% [12/43] vs. no POU: 8% [2/57]) had a major post-operative complication (Clavien-Dindo $\geq 3a$). On multivariable analysis, pre-operative opioid use was a significant predictor for a major complication (OR= 9.427, 95%CI:1.01-49.339, $p=0.008$), while administration of alvimopan seemed to have a protective effect (OR= 0.222, 95%CI: 0.050-0.977, $p=0.046$). On multivariable regression analysis, pre-operative opioid use ($p=0.037$) was associated with an increased length of stay, and both epidural block ($p=0.009$) and transverse abdominis block ($p=0.024$) were associated with decreased length of stay. Twenty-one patients were readmitted post-operatively.

On multivariable analysis, pre-operative opioid use was predictive of readmission (OR=4.310, 95%CI: 1.091-17.028, p=0.037.) When a POU cut-off of 300 MME (e.g. 60 tablets of Hydrocodone/acetaminophen 5/325) in the 6 months prior to surgery was selected, POU

remained a significant predictor of major post-operative complications (OR=3.580 95%CI:1.015-12.629, p=0.047).

Conclusions/Discussion: This study demonstrates that POU is a significant predictor of major post-operative

W33 Univariable and multivariable binary logistic regression analysis for predictors of a major post-operative complication (Clavien-Dindo $\geq 3a$)

N=100 patients		Univariable analysis			Multivariable analysis		
		OR	95% CI	P-value	OR	95% CI	P-value
	Gender- Female	1.98	0.58-6.81	0.279			
	Race- Caucasian	0.59	0.14-2.45	0.471			
	Age at surgery	0.98	0.93-1.02	0.261			
Smoking status	Current	1	-	-			
	Ex-smoker	1.09	0.32-3.68	0.895			
	Never	0.97	0.18-5.44	0.976			
BMI (kg/m ²)	Underweight	1	-	-			
	Normal weight	0.67	0.11-3.93	0.654			
	Overweight	0.92	0.13-6.78	0.937			
	Obese	0.43	0.06-3.03	0.395			
Charlson Comorbidity Index	0	1	-	-			
	1-2	1.56	0.18-13.83	0.691			
	>3	1.44	0.14-14.65	0.758			
	Previous abdominal surgery	1.08	0.31-3.77	0.900			
Montreal Age	A1 (<16 years)	1	-	-			
	A2 (17-40 years)	1.39	0.20-9.77	0.744			
	A3 (>40 years)	0.89	0.17-4.62	0.885			
	Montreal Location- L3	0.81	0.24-2.71	0.738			
	Montreal Behavior- B2	0.50	0.16-1.57	0.234			
Harvey-Bradshaw Index	Remission	1	-	-			
	Mild disease	1.39	0.00- ∞	0.999			
	Moderate disease	0.89	0.36-4.72	0.690			
	Pre-operative opioid use	10.65	2.24-50.68	0.003	9.43	1.80-49.34	0.008
	Pre-operative white blood cell count	1.14	1.01-1.29	0.034	1.04	0.90-1.20	0.615
	Pre-operative hemoglobin	0.89	0.69-1.14	0.364			
	Pre-operative albumin	0.59	0.22-1.58	0.292			
	Transverse abdominis plane block	0.28	0.03-2.29	0.232			
	Epidural block	0.58	0.15-2.33	0.443			
Current surgery access	Open	1	-	-			
	Laparoscopic	1.09	0.11-9.97	0.961			
	Laparoscopic to open	0.35	0.03-4.56	0.345			
	Ostomy at current surgery	4.70	1.45-15.22	0.010	2.99	0.75-12.04	0.112
	Fistula takedown at current surgery	0.63	0.13-3.07	0.567			
	Multivisceral resection	0.59	0.12-2.86	0.510			
	Length of surgery	1.00	0.99-1.01	0.284			
	Estimated surgical blood loss	1.00	0.99-1.00	0.396			
	Enhanced recovery pathway	0.81	0.23-2.85	0.808			
	Alvimopan use	0.21	0.05-0.79	0.021	0.22	0.05-0.98	0.046
	Neuropathic agent use	0.87	0.25-3.04	0.832			
	Inpatient opioid use	1.01	0.99-1.01	0.105			

Harvey-Bradshaw Index: Remission <5, Mild disease 5-7, Moderate disease 8-16

complications in CD patients. While other studies have demonstrated the adverse effects of POU in surgical patients, these data demonstrate the effect of the magnitude of opioid dose on adverse outcomes in Crohn's patients undergoing elective ileocolic resection.

MULTIVARIATE PREDICTION OF INTRAOPERATIVE ABANDONMENT OF ILEAL POUCH ANAL ANASTOMOSIS.

W34

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Purpose/Background: Restorative total proctocolectomy (TPC) with ileal pouch anal anastomosis (IPAA) is the procedure of choice for patients with mucosal chronic ulcerative colitis or familial adenomatous polyposis. However, for some patients IPAA is not feasible due to technical intraoperative limitations. There is no proven method of predicting the risk of intraoperative abandonment of IPAA. This study aimed to assess various preoperative predictors for intraoperative abandonment of IPAA and to review the subsequent management of these patients.

Methods/Interventions: All patients ≥ 18 years who underwent IPAA from January 2010 to May 2018 at our institution were queried from an IRB-approved database. Patients with successful IPAA creation as planned were grouped as 'Successful IPAA Creation'. To identify patients who were initially offered IPAA but had alternative procedures such as end ileostomy, we first queried the database with CPT codes of alternative procedures – 44155, 44212, 44156 and 44157. We reviewed the operative reports to identify patients in whom IPAA was preoperatively planned but was intraoperatively abandoned, grouped as 'IPAA abandoned'. Comparison was made between the groups for age, gender, ASA class, body mass index (BMI), indication of operation, IPAA procedure approach (traditional 2-stage vs 3-stage IPAA) and operative approach (open, laparoscopic, hand-assisted, robotic or taTME). We developed multivariate logistic regression models to determine the predictors of intraoperative IPAA abandonment. We also reviewed the subsequent management and short term outcome of patients who had failed the initial attempt of IPAA creation.

Results/Outcome(s): Out of 1438 patients who were offered IPAA (31.7% with 2-stage IPAA, mean age 41.3 ± 14.4 years, 58.7% males, mean BMI was $25.9 \pm 4.8 \text{ kg/m}^2$), 21 individuals (1.5%) experienced IPAA abandonment due to technical limitations (Table). Causes of IPAA abandonment were described as 'inadequate reach' in 17 patients and other technical reasons such as fibrotic or narrow pelvis in the remaining 4. These patients underwent alternative procedures such as end or loop ileostomy with or without proctectomy. Multivariate logistic regression

analysis indicated male gender (OR 6.021, 95% CI: 1.540-23.534; $p=0.010$), BMI (OR 1.217, 95% CI: 1.114-1.329; $p<0.001$) and 2-staged IPAA (OR 14.510, 95% CI: 4.123-51.064, $p<0.001$) as independent factors associated with intraoperative abandonment of IPAA creation. Subgroup analysis showed that male obese patients (BMI $\geq 30 \text{ kg/m}^2$) have 3-fold higher risk of intraoperative IPAA abandonment (4.5%, 95% Exact CI 1.8-9.1) compared to the overall cohort with planned IPAA procedures. Alternative procedures following IPAA abandonment were total proctocolectomy with end ileostomy in 14 patients or total abdominal colectomy plus end ileostomy without proctectomy in 7. Ultimately, IPAA creation was possible in 6 out of 21 patients after a median interval of 8.8 (range 4.1-34.8) months. All of these patients had intentional weight loss (BMI decrease from 33.5 ± 3.6 to $30.7 \pm 3.9 \text{ kg/m}^2$, $p=0.010$) before reattempt and all except one underwent total abdominal colectomy plus end ileostomy without proctectomy as their alternative procedure following initial IPAA abandonment.

Conclusions/Discussion: IPAA abandonment is a rare occurrence which can be mitigated by initial total abdominal colectomy and weight loss. Male, obese patients are at higher risk of failure. The intraoperative assessment of IPAA feasibility should preferentially occur prior to rectal dissection. Despite a low incidence, preoperative counseling about the potential of a permanent ileostomy is important.

TRANSVERSE ABDOMINIS PLANE (TAP) BLOCK IN COLORECTAL SURGERY: DOES TIMING MATTER?

W41

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Purpose/Background: Narcotics are known to have adverse side effects affecting recovery after colorectal surgery. Most relevant to this patient population are nausea, vomiting, and ileus. For this reason, non-narcotic sources of analgesia, such as the transverse abdominis plane (TAP) block, are being utilized to manage post-operative pain. The purpose of this study was to determine if the timing of TAP block administration affects post-operative pain scores and narcotic use in patients undergoing colon and rectal surgery.

Methods/Interventions: This is a retrospective analysis of patients who underwent TAP block for colon and rectal surgery between October 2015 and July 2018 as part of a Colon and Rectal Enhanced Recovery After Surgery (ERAS) pathway. The main outcomes were total post-operative oral morphine equivalents (OME) and subjective pain scores in the initial 24 hours post-operatively. Univariate analysis was performed using a Student's t-test,

and multivariable analysis was performed using linear regression.

Results/Outcome(s): A total of 244 patients were included. Of these patients, 86.9% underwent a TAP block at the beginning of surgery and 13.1% underwent a TAP block at the end of the procedure. Alternatives to narcotics were used post-operatively in the majority of

patients with 97.1% receiving intravenous acetaminophen, 73.0% receiving celecoxib, 91.8% receiving gabapentin and 29.5% using ketamine. TAP blocks administered at the beginning of surgery were performed by an anesthesiologist 84.0% of the time, whereas TAP blocks performed at the end of surgery were performed by the surgeon 68.8% of the time. The mean post-operative pain scores were

W34 Table 1. Baseline characteristics of patients who were offered IPAA procedure

Parameters	Total (n=1438)	IPAA abandoned (n=21)	Successful IPAA creation (n=1417)	p value
Age (years), mean(SD)	41.3 (14.4)	49.2 (12.9)	41.2 (14.4)	0.011
Gender (male), n(%)	844 (58.7%)	18 (85.7%)	826 (58.3%)	0.011
ASA Class	-	-	-	0.916
1-2	906 (63.0%)	13 (61.9%)	893 (63.0%)	
3-4	532 (37.0%)	8 (38.1%)	524 (37.0%)	
Height (cm), mean(SD)	172.4 (10.2)	174.5 (8.4)	172.3 (10.2)	0.332
Weight (kg), mean(SD)	77.3 (17.2)	94.2 (19.0)	77.1 (17.0)	<0.001
BMI, mean(SD)	25.9 (4.8)	30.9 (5.5)	25.8 (4.7)	<0.001
BMI Class				<0.001
<18.5	56 (3.9%)	0 (0.0%)	56 (3.9%)	
18.5-25.0	588 (40.9%)	2 (9.5%)	586 (41.4%)	
25.1-30.0	535 (37.2%)	10 (47.6%)	525 (37.1%)	
30.1-35.0	200 (13.9%)	4 (19.1%)	196 (13.8%)	
35.1-40.0	45 (3.1%)	4 (19.1%)	41 (2.9%)	
>40.0	14 (1.0%)	1 (4.7%)	13 (0.9%)	
Obese vs Non obese				0.007
<30.0	1179(82.0%)	12 (57.1%)	1167 (82.4%)	
≥30.0	259 (18.0%)	9 (42.9%)	250 (17.6%)	
Primary Indication for IPAA, n(%)	-	-	-	0.350
Inflammatory bowel disease	-	-	-	
Ulcerative Colitis (UC)	1288(89.6%)	19 (90.5%)	1269(89.6%)	
Not UC	26 (1.8%)	0 (0.0%)	26 (1.8%)	
Familial Cancer Syndrome	64 (4.5%)	2 (9.5%)	62 (4.4%)	
Synchronous Cancer	33 (2.3%)	0 (0.0%)	33 (2.3%)	
Others‡	27 (1.9%)	0 (0.0%)	27 (1.9%)	
Previous abdominal surgery, n (%)	-	-	-	<0.001
Yes	1048 (72.9%)	6 (28.6%)	1042 (73.5%)	
No	390 (27.1%)	15 (71.4%)	375 (26.5%)	
Stages of IPAA	-	-	-	<0.001
Traditional 2-stage IPAA†	456 (31.7%)	18 (85.7%)	438 (30.9%)	
3-stage IPAA	982 (68.3%)	3 (14.3%)	979 (69.1%)	
Operative Approach during Pouch Creation, n (%)	-	-	-	0.053
Open	855 (59.5%)	9 (42.9%)	846 (59.7%)	
Laparoscopic	483 (33.6%)	8 (38.1%)	475 (33.5%)	
Hand Assisted	59 (4.1%)	3 (14.3%)	56 (4.0%)	
Robotic	26 (1.8%)	0 (0.0%)	26 (1.8%)	
TaTME	15 (1.0%)	1 (4.7%)	14 (1.0%)	

‡Other rare indications of IPAA (e.g. Hirshsprungs, dysautonomia).

†Traditional 2-stage IPAA: total proctocolectomy with IPAA and diverting loop ileostomy (1st stage), followed by diverting loop ileostomy closure (2nd stage).

significantly lower in patients who received a TAP block at the beginning of surgery (4.3/10) compared to at the end (4.5/10), ($p=0.0162$). The mean total oral morphine equivalents (OME) were also significantly lower in patients who had a TAP block at the beginning of surgery compared to patients who received it at the end (52.5 vs 83.0, respectively; $p<0.0001$).

Conclusions/Discussion: TAP blocks administered prior to surgery are associated with significantly lower post-operative pain scores and narcotic use. These findings suggest that pre-emptive analgesia is critical to optimize pain control, and offers sustained benefits in the post-operative period.

EMBEDDING OPIOID REDUCTION STRATEGIES IN ESTABLISHED ENHANCED RECOVERY AFTER SURGERY PROGRAMS: PERIOPERATIVE OUTCOMES FROM A MULTI-DISCIPLINARY APPROACH.

W42

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Purpose/Background: With the opioid crisis in the United States it has become imperative to incorporate opioid mitigation strategies in any best practices based surgical program. We assess the impact of an education-focused opioid-reduction strategy within well-established enhanced recovery pathways across multiple disciplines at a tertiary teaching center.

Methods/Interventions: We used a provider targeted education approach to implement an opioid reduction strategy among all patients participating in an Enhanced Recovery after Surgery (ERAS) programs in the service lines of Colorectal Surgery, Benign Gynecology, Gynecology Oncology, and Urologic Oncology at a single tertiary center. For nurses the educational focus was on evaluation of surgical versus non-surgical (gas) pain and judicious use of opioids while advocating use of other analgesic adjuncts. For residents / nurse practitioners focus was on setting patient expectations regarding postoperative pain, consistent use of multimodal analgesia intra and postoperatively and avoiding escalating opioid use without discussing risk and benefit with patients. To evaluate the program's effectiveness, we used a before-after approach, comparing electronic health records of patients who participated in our ERAS program in the 12 months preceding ($n=869$) and subsequent to ($n=838$) the implementation of the program. We used linear and logistic regression to evaluate the association between year of surgery and oral morphine equivalents (OME) used, average patient pain scores, post procedure time to ambulation, urinary catheter duration, time to solid food, post procedure length of stay, and likelihood of readmission. The

regression analyses accounted for age, gender, service line, American Society of Anesthesiologist (ASA) score, current opioid use (including methadone), surgical technique, case mix index, epidural use, and multimodal analgesic use (intra-operative and post-operative).

Results/Outcome(s): When comparing patients in the pre- and post-opioid reduction strategy implementation, there were no significant differences in gender (69% vs 70% women), prior opioid use (34% vs 33%), open surgical procedure (53% for both) and case mix index [median 1.95 (IQR 1.6-2.5) versus 1.96 (IQR 1.6-2.4)]. Patients in the pre-intervention group were somewhat younger [median age 54 (IQR 43-66) versus 57 (IQR 43-67)]. On adjusted analyses, we found that year of surgery post opioid reduction strategy was associated with significant decrease in intraoperative OME (lower by 14.5 +/- 2.4 mEQ $p < 0.0001$), day prior to discharge OME (lower by 18 +/- 6.5 mEQ $p < 0.005$), and day of discharge OME (lower by 9.6 +/- 3.28 mEQ $p < 0.003$), but not with post-operative 0-24 hour OME (Figure 1A). The average postop pain scores were modestly higher but not by a range that is likely to be clinically relevant (Figure 1B). With reduction in OME, there was a significant reduction in days to solid food (lower by 0.58 +/- 0.15 days $p < 0.0002$). There were no significant changes in post procedure length of stay, post procedure time to ambulation or urinary catheter duration, or likelihood of readmission (OR 1.15. 95% CI 0.8 to 1.5).

Conclusions/Discussion: In the last decade, the popularity of ERAS Programs in the United States has grown due to a significant positive impact on post-surgical recovery, length of stay reduction, improved patient satisfaction, and reduction in costs. These multidisciplinary best practice strategies are now widely implemented across surgical disciplines and most are mature programs. It is unclear if expending additional resources in these programs are likely to result in further improvements. In parallel, the opioid crisis in the US has resulted in a significant impetus on all health care providers to decrease their use and prevent addiction as a growing body of evidence suggests a link between post-operative opioid use and eventual opioid dependence. We show that focusing on provider and patient education using the existing ERAS core principles of multimodal analgesia and setting of expectations (related to pain management and need for opioids) can result in further reduction of opioid use in the perioperative setting. Although we were unable to show that further reduction in opioid use resulted in a reduction of post procedure length of stay, we think this speaks to the maturity of the ERAS programs at our institution. The goal of opioid reduction is itself of significant benefit both to the patient (as an example reduction in time to solid food); and to the local community, as patients are sent home on less opioids (i.e. a reduction in opioid use that continued to the day of discharge). Ultimately solving the opioid problem facing our patients will require multiple

strategies limiting need and access to opioid medications. This study shows a promising place to start within the perioperative space.

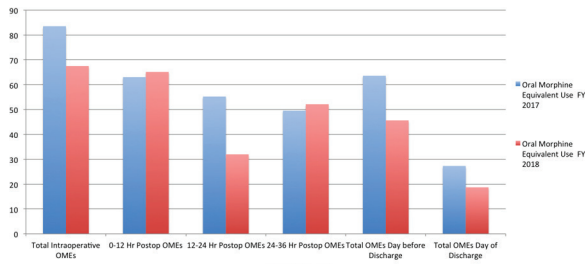


FIGURE 1A

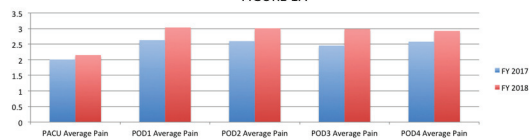


FIGURE 1B

IMPLEMENTATION OF THE ACS NAPRC SYNOPTIC OPERATIVE REPORT: A MIXED METHODS STUDY.

W43

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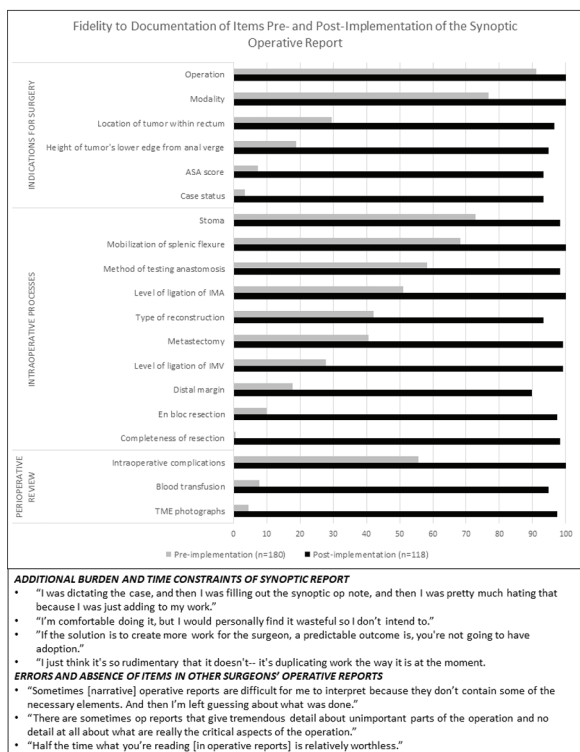
Purpose/Background: The ACS National Accreditation Program for Rectal Cancer (NAPRC) is a collaborative effort to improve the quality of rectal cancer care, including multidisciplinary assessment, treatment planning, and documentation using synoptic radiology, pathology and operative reports. We used the ASCRS rectal cancer checklist to guide development of a standardized synoptic operative report of critical items and pilot tested its implementation.

Methods/Interventions: A committee of expert colorectal surgeons developed a list of 19 critical items for the synoptic operative report, which was iteratively reviewed, revised, and ultimately approved by ASCRS Executive Council and the ACS NAPRC. The synoptic report was implemented into multiple institutions' EHR systems. Both pre- and post-implementation of the synoptic report, participating surgeons submitted up to five sequential, de-identified rectal cancer operative reports. Fidelity to the 19 items was assessed per operative report for both pre-implementation traditional narrative reports and and post-implementation synoptic reports. Through a subsequent online survey, participants indicated overall feasibility, usability, and acceptability of the synoptic report. Through convergent semi-structured interviews, participants also qualitatively shared in-depth details and perspectives about their experiences with the synoptic operative report. Interview transcripts were coded independently by at least two team members and thematically

analyzed. Quantitative and qualitative data were integrated through a joint display of data (figure).

Results/Outcome(s): 37 surgeons from 14 institutions submitted a total of 180 pre-implementation operative reports; 32/37 surgeons submitted a total of 118 post-implementation reports. Fidelity to documentation of all 19 items improved significantly from pre- to post-implementation. While details pertaining to the operation type, modality, and stoma were present in > 70% of *pre-implementation* reports, information about the location of the tumor within the rectum, the type of reconstruction, and the distal margin were present in < 50%. In contrast, each of the 19 items was present in at least 90% of *post-implementation* reports. 27/37 participants completed the survey and, on a 1-5 scale, ranked the mean feasibility = 3.90 (standard deviation [sd] 0.83), usability = 4.11 (sd 0.75), and acceptability = 4.01 (sd 0.97). 82% of participants agreed or strongly agreed that the synoptic report was easy to access (4.26 (sd 0.86)) and 89% of participants agreed or strongly agreed that it was appropriate for use during rectal cancer procedures (4.26 (sd 0.66)). However, only 59% reported that the synoptic report is convenient for use (3.78 (sd 0.93)). 21/37 participants completed qualitative interviews. Emergent themes included (1) concerns for additional burden and time constraints using the synoptic report, and (2) errors or absent information in traditional narrative operative reports of other surgeons. Some senior surgeons characterized themselves as unenthusiastic about technology and documentation changes, citing concerns for distraction from patient care. Other surgeons indicated that they enjoyed specific aspects of the process, such as (1) opportunities for education of other surgeons and self-reminders, (2) engagement within a dedicated community of rectal cancer surgeons, and (3) data collection for future assessment of processes and outcomes.

Conclusions/Discussion: Although feasibility, usability, and acceptability were high and fidelity to the 19 items increased following implementation of the synoptic report, reactions to the synoptic report varied within and between participating surgeons. Most emphasized that it provided no extra value to them and indicated they would use it only if mandated because of concerns that it would hinder their workflow or add extra time burden. However, others felt the synoptic report could indirectly improve rectal cancer quality of care and provide useful data for research and future QI. More work is needed to improve the synoptic operative report and streamline the workflow.



IMPACT OF ENHANCED RECOVERY AFTER SURGERY PROGRAM IMPLEMENTATION ON INDEX HOSPITAL COST CENTERS.

W44

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Purpose/Background: Enhanced recovery after surgery (ERAS) programs have repeatedly been shown to improve the value of colorectal surgery by improving outcomes and reducing costs. Local ERAS implementations and their ongoing support require significant hospital-level resources that, in an era of increasing financial strain on healthcare systems, often require clear justification to attain. Most hospitals in the United States are reimbursed for colectomy via a bundled payment based on the diagnosis-related group (DRG) assigned; revenue is generally unaffected by ERAS implementation at the patient level. Returns on investment to hospitals implementing ERAS programs are accordingly limited to reducing overall costs associated with the index hospitalization. Analyses of ERAS-related cost savings to date frequently include post-discharge/non-index hospitalization savings - which generally accrue to payors and not acute care hospitals - and/or rely on modeled costs associated with length of stay (LOS) reductions that do not assess granular impact on actual hospital cost centers. The purpose of this study is to analyze the actual index-hospitalization impact on specific cost centers associated with ERAS implementation for

DRGs commonly assigned to patients undergoing colon resections.

Methods/Interventions: We performed a single institution retrospective, non-randomized, pre- (2013-2015) and post-intervention (2015-2017) analysis of hospital costs associated with the index hospitalization of patients undergoing colon resections. We identified patients who had billing DRGs 330 (colectomy with complications/comorbidities) and 331 (colectomy without complications/comorbidities). The primary outcome was total index hospitalization cost. Secondary outcomes included specific cost center expenses. All costs were adjusted for inflation.

Results/Outcome(s): For DRG 330, there were 745 patients identified with 205 (27.5%) in the control group and 540 (72.5%) in the ERAS implementation group. For DRG 331, there were 505 patients identified with 100 (19.8%) in the control group and 405 (80.2%) in the ERAS implementation group. Total cost for DRG 330 in the control group was \$24,111 (\$19,285-\$28,658) compared to \$21,896 (\$17,477-\$29,179) in the ERAS group, $p=0.01$. Total cost for DRG 331 in the control group was \$19,268 (\$17,286-\$21,858) compared to \$18,444 (\$15,506-\$22,847) in the ERAS group, $p=0.22$. Extrapolating these savings to colorectal centers performing 500 ERAS colectomy cases per year, total savings would be \$1,107,500 for DRG 330 and \$412,000 for DRG 331. When assessing cost changes after ERAS implementation for DRG 330, operating room (OR) costs increased ($p=0.90$), nursing costs decreased ($p=0.02$) anesthesia costs increased ($p=0.20$), and pharmacy costs increased ($p=0.08$). For DRG 331, OR costs increased ($p=0.001$), nursing costs decreased ($p<0.001$) anesthesia costs increased ($p=0.03$), and pharmacy costs increased ($p=0.001$).

Conclusions/Discussion: The returns on investment at the hospital level for ERAS implementations in colorectal surgery result largely from cost-savings associated with decreased nursing expenses. These savings offset increased spending on OR supplies, anesthesia, and medications. Estimates of the financial impact on individual hospital cost centers may help surgeons working with hospital administrative/financial leaders to obtain funding for ERAS programs.

Diagnosis-Related Group	Control Patient's Cost	ERAS Patient's Cost	p value	Annual Total ERAS Cost Savings for 500 Cases
330 (colectomy with complications/comorbidities)	\$24,111 (\$19,285-\$28,658)	\$21,896 (\$17,477-\$29,179)	0.01	\$1,107,500
Operating room	\$9,355 (\$7,949-\$11,326)	\$9,421 (\$7,623-\$12,264)	0.90	-
Nursing	\$9,106 (\$6,612-\$13,493)	\$7,724 (\$4,966-\$12,287)	0.02	-
Anesthesia	\$1,488 (\$1,251-\$1,940)	\$1,616 (\$1,217-\$2,099)	0.20	-
Pharmacy	\$863 (\$609-\$1,339)	\$945 (\$639-\$1,409)	0.08	-
Clinical labs	\$562 (\$291-\$903)	\$511 (\$303-\$947)	0.33	-
Blood draw	\$193 (\$81-\$391)	\$188 (\$62-\$384)	0.68	-
331 (colectomy without complications/comorbidities)	\$19,268 (\$17,286-\$21,858)	\$18,444 (\$15,506-\$22,847)	0.22	\$412,000
Operating room	\$8,339 (\$7,376-\$10,251)	\$9,605 (\$7,431-\$12,316)	0.001	-
Nursing	\$6,899 (\$5,381-\$8,590)	\$4,972 (\$3,876-\$7,067)	<0.001	-
Anesthesia	\$1,456 (\$1,147-\$1,707)	\$1,617 (\$1,260-\$1,980)	0.03	-
Pharmacy	\$557 (\$439-\$797)	\$683 (\$512-\$908)	0.001	-
Clinical labs	\$276 (\$221-\$423)	\$331 (\$228-\$609)	0.16	-
Blood draw	\$78 (\$28-\$159)	\$63 (\$31-\$189)	0.91	-

*cost presented as median and interquartile range

ASSESSING THE QUALITY OF RECTAL CANCER PATHOLOGY REPORTS IN NRG ONCOLOGY/ NSABP R-04.

W45

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Purpose/Background: Accurate and comprehensive surgical pathology reports are integral to the quality of cancer care provided. Despite guidelines set forth by the College of American Pathologists (CAP), variations in reporting quality continue to exist. The aim of the current study was to evaluate the quality of rectal cancer pathology reporting and to identify any potential factors contributing to variations.

Methods/Interventions: Pathology reports for patients (pts) with rectal cancer enrolled in the NSABP R-04

study from July 2004 to August 2010 were retrospectively identified. Adherence to pathology reporting elements in the CAP guidelines as outlined in the Surgical Pathology Cancer Case Summary for Colon and Rectal Cancer was evaluated. Adherence to CAP guidelines was calculated as the percentage of CAP-designated required reporting elements documented within a pathology report. Use of the synoptic reporting method, academic status, rural v urban setting, and hospital bed size were evaluated for their impact on the quality of pathology reports.

Results/Outcome(s): We identified 1,004 surgical pathology reports for rectal cancer surgery from 383 hospitals and 755 pathologists. Overall adherence rate to CAP guidelines was 73.3% (standard deviation [SD], 16.0%). CAP-required elements that were inconsistently reported (>15% reporting deficiency), are noted in Table 1. Synoptic reporting (SR) was employed in 175 of 1,004 reports (17.4%). Use of the SR format had higher adherence

W45 Table 1: Documentation rate of required CAP guideline elements in rectal cancer surgical pathology reports: NSABP R-04

Required elements of CAP Guidelines for Rectal Cancer Pathology Report	All reports	Synoptic report	No synoptic report	P-value
	N (%)			
	N=1004	17.4%	82.6%	-
Specimen	1002 (99.8)	174 (99.4)	828 (99.9)	0.224
Procedure	659 (65.6)	<i>139 (79.4)</i>	<i>520 (62.7)</i>	<0.001
Tumor site	957 (95.3)	174 (99.4)	783 (94.5)	0.005
Tumor size	965 (96.1)	173 (98.9)	792 (95.5)	0.039
Macroscopic tumor perforation	238 (23.7)	<i>76 (43.4)</i>	<i>162 (19.5)</i>	<0.001
Histologic type	986 (98.2)	175 (100)	811 (97.8)	0.392
Histologic grade	781 (77.8)	<i>172 (98.3)</i>	<i>609 (73.5)</i>	<0.001
Microscopic tumor extension	955 (95.1)	172 (98.3)	783 (94.5)	0.032
Margins: Proximal	878 (87.4)	172 (98.3)	706 (85.2)	<0.001
Margins: Distal	938 (93.4)	172 (98.3)	766 (92.4)	0.004
Margins: Radial	849 (84.6)	<i>166 (97.9)</i>	<i>683 (82.4)</i>	<0.001
Distance of invasive carcinoma from closest margin	471 (47.91)	<i>107 (61.1)</i>	<i>364 (43.9)</i>	<0.001
Treatment effect	473 (47.11)	94 (53.7)	379 (45.7)	0.054
Lymphovascular invasion	734 (73.11)	<i>173 (98.9)</i>	<i>561 (67.7)</i>	<0.001
Perineural invasion	355 (35.36)	<i>129 (73.7)</i>	<i>226 (27.3)</i>	<0.001
Tumor deposits	163 (16.21)	<i>58 (33.1)</i>	<i>105 (12.7)</i>	<0.001
TNM descriptors	288 (28.69)	<i>79 (45.1)</i>	<i>209 (25.2)</i>	<0.001
T stage	767 (76.39)	<i>170 (97.1)</i>	<i>597 (72.0)</i>	<0.001
N stage	755 (75.20)	<i>166 (94.9)</i>	<i>589 (71.0)</i>	<0.001
# lymph nodes involved	990 (98.60)	174 (99.4)	816 (98.4)	0.31
# lymph nodes examined	993 (98.90)	175 (100)	818 (98.7)	0.51
Overall adherence to CAP guidelines				
Overall adherence rate (%)	73.3% [16.0]	85.2% [16.0]	70.8% [16.0]	<0.001
Mean, [SD]				

Bold – CAP-required elements with >15% reporting deficiency among all reports.

Italic – Reporting elements with >15% difference in reporting rates between synoptic reporting use vs. no synoptic reporting use

rate to the CAP guidelines (85.2% [9.3] v 70.8% [16.0], $p < 0.001$). Hospitals in urban areas had higher adherence rate compared those from rural areas (73.5% [15.9] v 66% [15.9], $p = 0.0031$), whereas academic status and hospital bed size had no impact. Interestingly, variations in reporting quality existed not only between institutions, but also within individual hospitals and pathologists. Half of the hospitals had $\geq 20\%$ difference in adherence rates within their own reports. Similarly, half of all pathologists had $\geq 15\%$ difference in adherence rates within their own reports. Among pathologists using the SR format, 50% used it consistently. Lastly, a trend for improved adherence to the CAP guidelines appeared over time: 2005=65.7% v 2010=82.3%, $p < 0.001$, which coincided with the increased adoption of SR by pathologists (2005 v 2010, 9.4% v 25.3%, $p < 0.001$).

Conclusions/Discussion: Quality of pathology reporting for rectal cancer specimens varies widely despite the existence of CAP guidelines for more than a decade. Our findings suggest the need for further improvement in this key aspect of oncology care for rectal cancer pts. Of note, the National Accreditation Program for Rectal Cancer mandates that surgical pathology reports meet strict quality standards. Further work is needed to evaluate the implementation of standardized pathology reporting and the resultant impact on quality and outcomes for pts with rectal cancer. **Support:** U10CA180868, -180822, UG1CA189867, and Roche Laboratories, Inc, and Sanofi-Synthelabo Inc.

REACHING FOR THE STARS: DATA ACCURACY AND PREDICTORS OF HIGHLY RATED COLON AND RECTAL SURGEONS ON AN ONLINE PHYSICIAN RATING WEBSITE.

W46

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Purpose/Background: Online physician rating websites (PRWs), such as Healthgrades.com, are used by 60% of healthcare consumers to select new providers. Little data exists regarding the validity of these proprietary websites. In this study, a large random nationwide sample of colon and rectal surgeons from Healthgrades.com was used to assess accuracy of board certification status, to identify predictors of higher surgeon ratings, and to determine whether higher surgeon ratings correlate with affiliated hospital Centers for Medicare and Medicaid Services (CMS) and Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores.

Methods/Interventions: A subset of 500 surgeons was randomized from 3,043 Healthgrades.com designated "colon and rectal surgery specialists" and further analyzed. Board designation status was verified online with the

American Board of Surgery (ABS) and American Board of Colon and Rectal Surgery (ABCRS) official websites. Factors predicting top quartile star ratings were identified using univariable logistic regressions for surgeons with ≥ 5 ratings. A multivariable logistic regression model was then created using backwards stepwise selection, beginning with the most clinically relevant variables. The final model only contained variables that met a $p < 0.05$ inclusion threshold. Healthgrades star ratings of each surgeon were compared to their affiliated CMS and HCAHPS ratings using pairwise Pearson's correlations.

Results/Outcome(s): Of 500 "colon and rectal surgery specialists," 48 (9.6%) were excluded from further analysis for being in training, in non-surgical specialties, non-physicians, out of the country, retired, or deceased. Of the final cohort, 77.7% were male, mean age was 53.3 years (SD 12.2), mean years in practice was 17.7 (SD 12.5), and 298 (66%) had an active ABCRS certification. Healthgrades was 80% accurate in reporting ABS certification and 86% accurate in reporting ABCRS certification. Mean rating was 4.2/5 stars (median 4.2, range 1-5) and each surgeon received on average 12 ratings (median 8, range 0-125) and 3 comments (median 1, range 0-71). Of all ratings, 79% were five-star, 17% were one-star, and 4% were two-to-four-stars. Only 30% of ratings were accompanied by comments, and of comments written, 84% were five-star comments, 13% were one-star comments, and only 3% were two-to-four-star comments. On univariate logistic regression, surgeons in the top quartile of star ratings ($\geq 4.8/5$) were statistically more likely to lack Healthgrades ABCRS designation ($p = 0.03$) and have either < 5 years ($p = 0.00$) or > 36 years in practice ($p = 0.01$); all other variables studied showed no significant associations with star ratings (Table). A multivariable logistic model using both Healthgrades ABCRS designation and years in practice significantly predicted top quartile rating status ($p = 0.02$). Surgeon ratings did not correlate with affiliate hospital CMS ($r = -0.02$, $p = 0.73$) or HCAHPS scores ($r = -0.02$, $p = 0.06$); however, HCAHPS and CMS scores correlated significantly with each other ($r = 0.53$, $p = 0.00$).

Conclusions/Discussion: Healthgrades.com inaccurately reported ABS and ABCRS certification in 20% and 14% of cases, respectively, despite this data being publicly available online. Although average surgeon ratings were high, there were few measurable predictors of high ratings in a multivariable model. In the modern age of healthcare consumerism, physician rating websites should be used with caution given inaccuracies and lack of validation with outcomes. More accurate online resources are needed to inform patient decisions.

Surgeon characteristics	Odds Ratio	95% CI	p-value
Male Gender	1.03	(0.58, 1.85)	0.91
Region			0.45
Northeast	1.29	(0.63, 2.65)	0.49
Midwest	1.33	(0.66, 2.71)	0.43
South	1.69	(0.88, 3.24)	0.12
West	ref	ref	ref
ABS Certified	1.04	(0.59, 1.86)	0.89
ABCRS Certified	0.88	(0.53, 1.46)	0.63
Healthgrades ABS Designation	0.72	(0.43, 1.20)	0.20
Healthgrades ABCRS Designation	0.59	(0.36, 0.95)	0.03*
Years in practice			0.00*
<5 years	8.00	(2.41, 26.57)	0.00*
6-10 years	3.02	(0.93, 9.81)	0.06
11-15 years	1.34	(0.38, 4.76)	0.65
16-20 years	1.66	(0.46, 5.93)	0.44
21-25 years	2.80	(0.81, 9.71)	0.11
26-30 years	ref	ref	ref
31-35 years	3.06	(0.78, 12.09)	0.11
>36 years	5.53	(1.59, 19.24)	0.01*
Fellowship association	0.87	(0.47, 1.60)	0.65
MD provided self-description	0.89	(0.55, 1.45)	0.64
MD comment response	0.50	(0.50, 1.31)	0.22

Table. Surgeon characteristics predicting top quartile rating. Reference groups were chosen based on the group with the lowest percent in the top quartile and were designated with ref. Characteristics with $p < 0.05$ were designated with an asterisk.

PREOPERATIVE ACTIVITY LEVEL IS ASSOCIATED WITH RISK OF POSTOPERATIVE COMPLICATIONS FOLLOWING ELECTIVE COLORECTAL SURGERY: A PROSPECTIVE PILOT STUDY USING WEARABLE TECHNOLOGY.

W47

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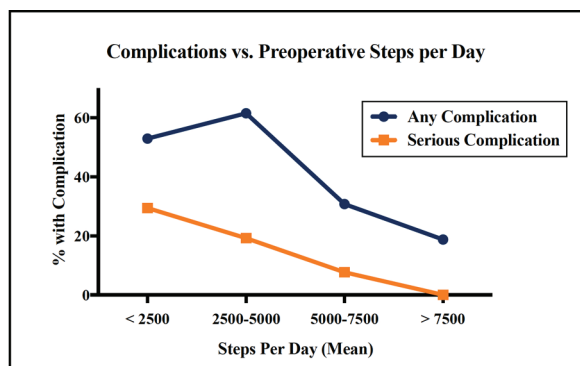
Purpose/Background: The implementation of evidence-based protocolized inpatient care pathways has resulted in major improvements in surgical outcomes over the past several decades. Further gains in relevant patient outcomes will likely require focused efforts to alter preexisting operative risk. Prehabilitation programs, or interventions aimed at improving a patient's functional capacity prior to surgery, provide a promising avenue for preoperative risk reduction. Though surgeons intuitively recognize that more physically active patients fare better during the perioperative period, the actual impact of preoperative activity on patient outcomes has not been well quantified. This pilot study utilized wearable technology to prospectively monitor patients' activity levels before and after colorectal surgery in order to evaluate the impact of preoperative activity on postoperative outcomes, hypothesizing that patients who were more active would have superior outcomes.

Methods/Interventions: All patients undergoing elective colorectal resection between January 15, 2018 and November 18, 2018 at a single academic institution were eligible for inclusion in this prospective pilot study. Patients were recruited and consented in the preoperative surgical clinic, at which point they were trained to use a wearable fitness device. Patients were instructed to wear the device for up to 60 days prior to surgery, throughout

their inpatient hospitalization, and for 30 days postoperatively. The device was returned at the patient's 30-day postoperative clinic appointment. Data was extracted from the device, encrypted, and securely stored on the institutional cloud storage system. Patients were stratified into active ($\geq 5,000$ steps/day) and non-active ($< 5,000$ steps/day) groups based on mean preoperative daily step count. The primary outcome was any postoperative complication with a secondary outcome of a serious complication, both as defined by the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP). Univariate analyses were performed to compare patient demographics, operative factors, and postoperative complications between active and non-active groups. Multivariable regression models analyzed the impact of preoperative activity level on overall and serious postoperative complications, adjusting for each patient's baseline preoperative risk as calculated using the ACS NSQIP Surgical Risk Calculator.

Results/Outcome(s): A total of 101 patients were consented for enrollment; seventy-two have completed the 30-day preoperative activity monitoring as well as 30-day postoperative surveillance for outcomes, while 29 have not (25 have not yet completed 30-day follow up, 1 patient withdrew from study, 3 patients canceled surgery). Twenty-nine (40.3%) patients were active preoperatively walking a mean 8,097 steps/day while 43 (59.7%) were non-active preoperatively walking a mean 2,898 steps/day ($p < 0.001$). Active patients tended to be younger (47.0 vs 60.0) with lower body mass index (25.3 vs 29.0) than non-active patients, but these differences did not reach statistical significance. Groups also had similar rates of comorbidities including hypertension, diabetes mellitus, and heart disease. Active patients experienced fewer overall complications (24.1% vs 58.1%; $p = 0.004$) and serious complications (3.5% vs 23.3%; $p = 0.022$). On multivariable analysis, active patients were significantly less likely to experience any postoperative complication (OR 0.29; $p = 0.029$). Active patients were also less likely to experience a significant complication, though this association did not reach significance (OR 0.38; $p = 0.081$).

Conclusions/Discussion: This study demonstrates the feasibility of wearable technology in monitoring patients undergoing major colorectal surgery through the perioperative period and that preoperative physical inactivity is associated with the development of postoperative complications. This pilot study will serve as the basis for a subsequent interventional trial to investigate whether wearable activity-tracking devices can be used to improve surgical outcomes through the use of a monitored preoperative exercise training program in patients undergoing elective colorectal surgery.



CENTRALIZING RECTAL CANCER SURGERY: WHAT IS THE IMPACT ON TRAVEL FOR PATIENTS?

W48

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Purpose/Background: Previous data have shown that patients who travel to high volume centers for their rectal cancer resection see improved outcomes. There is increasing interest in placing volume requirements on hospitals performing proctectomies for rectal cancer such as the ones recently proposed by the Leapfrog Group. However, centralization would lead to fewer hospitals which may have impact on access to care for many patients. This study aims to investigate trends in hospital volume and patient travel patterns as well as the impact centralization may have on patient travel.

Methods/Interventions: Patients with stage I-III rectal cancer who underwent elective proctectomy from 2004-2014 were queried from the New York State Cancer Registry and Statewide Planning and Research Cooperative System. Distance was calculated as the straight line distance between the centroid of the patient residence zip code and the hospital zip code. Hospital volume was broken up into tertiles (low: 0-7, medium: 8-19, high: 20+). To simulate the impact of centralization of rectal cancer care to high volume facilities on patient travel, the top tertile was used to assume which facilities would be left. Subsequently, the distance between the patient and the closest high volume facility was calculated. To account for the large New York City population, the calculations were repeated with those residing in a New York City zip code excluded.

Results/Outcome(s): A total of 5,860 patients met inclusion criteria. The total number of hospitals performing proctectomies for rectal cancer decreased from 121 in 2004 to 83 in 2014. The number of high and medium volume hospitals were not significantly changed between 2004 and 2014 (high: 9 vs. 11, medium: 23 vs. 20, respectively).

However, the number of low volume hospitals decreased significantly during the study period (low: 89 vs. 52). The average number of proctectomies performed at high volume centers increased from 16.6 to 24.4 from 2004 to 2014, but this remained static for low volume centers (2.1 to 1.8). The average number of miles traveled by patients in the cohort was 15.0 miles (SD=22.7) with a median of 8.0 (IQR 3.5-16.8, top decile 36.5-274.8). There was a significant difference in the mean distance patients traveled in 2004 vs. 2014 (12.1 miles vs. 15.4 miles, respectively; $p = 0.007$). In 2004, the top decile of the population traveled between 27.1 to 168.9 miles. In 2014 the top decile of the population traveled between 40.4 to 162.6 miles. If centralization resulted in only high volume facilities in the top tertile performing proctectomies for rectal cancer in New York State, there would be 11 total facilities. The mean distance patients would have to travel is 24.5 miles (SD=29.1) with a median of 10.3 miles (IQR 4.3-36.7). The top decile of the population would travel between 71.6 to 160.8 miles. If patients in New York City were excluded, prior to centralization, patients traveled the mean distance was 19.7 miles (SD=26.4) with a median of 11.4 miles (IQR 4.9-24.5, top decile 46.2-274.8). After centralization, patients would travel an average of 34.6 miles (SD=30.9) with a median of 24.0 miles (IQR 10.1-52.5, top decile 79.1-160.8).

Conclusions/Discussion: Our study shows that the number of hospital performing proctectomies for rectal cancer in New York State is decreasing and average volume is increasing. However, there are still many low volume hospitals that did not see any increase in volume over the study period. There was a statistically significant difference in the mean distance traveled by patients to have rectal cancer resection over the study period, but this was only a raw difference of 3 miles. If centralization of rectal cancer resections decreased the number of facilities to the current top tertile of 11 high volume centers, the mean travel distance would increase by 9 miles and the median would increase by 2.3 miles. However, there is a substantial proportion of the population that would see a large increase in their travel distance. This indicates that any plan for centralization in New York State will require careful planning in order to avoid placing undue travel burden on patients.

Changes in Cohort Characteristics Over the 3 Time Periods, 2004-2007, 2008-2011, 2012-2014				
Characteristics	2004-2007 (N=2267)	2008-2011 (N=2116)	2012-2014 (N=1477)	P-Value
Age (Median, IQR)	64 (55-74)	63 (53-74)	62 (52-72)	0.001
Sex				0.11
Male	1299 (57.3)	1220 (57.7)	895 (60.6)	
Female	968 (42.7)	896 (42.3)	582 (39.4)	
Race				0.003
White	1941 (85.6)	1815 (85.8)	1209 (81.9)	
Black	180 (7.9)	185 (8.7)	146 (9.9)	
Other	146 (6.4)	116 (5.5)	122 (8.3)	
Medicaid	217 (9.6)	232 (11.0)	211 (14.3)	<0.0001
Distance Traveled (Median, IQR)	7.6 (3.3-16.4)	8.2 (3.5-17.3)	8.2 (3.8-17.2)	0.08
Comorbidities				
CHF	101 (4.5)	115 (5.4)	73 (4.9)	0.33
Arrhythmias	205 (9.0)	227 (10.7)	157 (10.6)	0.12
Hypertension	1129 (49.8)	1146 (54.2)	770 (52.1)	0.02
COPD	285 (12.6)	323 (15.3)	231 (15.6)	0.01
Diabetes	395 (17.4)	399 (18.9)	308 (20.9)	0.03
Renal Failure	38 (1.7)	99 (4.7)	55 (3.7)	<0.0001
Obesity	114 (5.0)	191 (9.0)	185 (12.5)	<0.0001
Resection Type				0.79
Low Anterior Resection	1520 (67.1)	1417 (67.0)	1004 (68.0)	
APR	747 (32.9)	699 (33.0)	473 (32.0)	
Operative Approach				<0.0001
Open	2149 (94.8)	1569 (74.2)	715 (48.4)	
MIS	118 (5.2)	547 (25.8)	762 (51.6)	
AJCC Stage				0.06
1	821 (36.2)	748 (35.3)	497 (33.6)	
2	665 (29.3)	612 (28.9)	401 (27.2)	
3	781 (34.4)	756 (35.7)	579 (39.2)	
Surgeon Volume				<0.0001
Low	883 (38.9)	739 (34.9)	394 (26.7)	
Medium	596 (26.3)	559 (26.4)	471 (31.0)	
High	788 (34.8)	818 (38.7)	612 (41.4)	
Colorectal Boarded	1118 (49.3)	1302 (61.6)	962 (65.9)	<0.0001
Hospital Volume				<0.0001
Low	794 (35.0)	702 (33.2)	346 (23.4)	
Medium	758 (33.4)	699 (33.0)	508 (34.4)	
High	715 (31.5)	715 (33.8)	623 (42.2)	

DEVELOPMENT OF A PATIENT PEER-LED SOCIAL MEDIA PLATFORM TO DELIVER SUPPORT TO OSTOMY PATIENTS.

W49

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Purpose/Background: Ostomies are commonly formed in the surgical management of patients with inflammatory bowel disease or cancer. New ostomates face a significant physical and psychological adaptation. Impaired quality of life (QOL) is commonly reported (1), particularly in the early postoperative period. A lack of familiarization with stoma management has been proposed as a cause of extended length of stay in this patient group (2). Interventions to aid education in self-management have been effective in reducing readmission and dehydration-related complications in stoma patients (2). Significant benefits to patients of peer support programs have been reported in over 86% (3). Social media is broadly used by patients across health conditions and disease types. Benefits such as increased community support, greater social connectedness, health management, health promotion and knowledge acquisition have been reported (3). As a part of a broader quality improvement program, we designed, implemented and evaluated a patient-led social media program to provide a knowledge and experience base for ostomy patients.

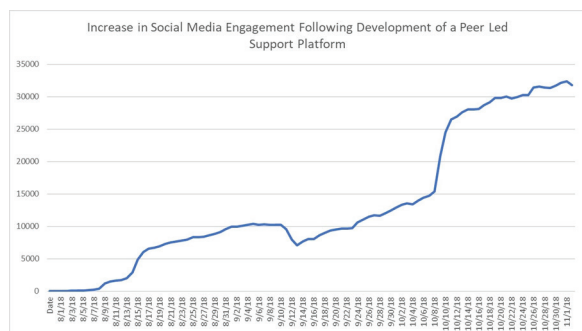
Methods/Interventions: 25 patients (20 female) were recruited as peer support 'Patient Coaches' via stoma support groups and social media between April 2017 and August 2018.

A literature review identified the areas most commonly identified as problematic for stoma patients. This was refined into a set of focus themes by a Delphi process. A structured program and strategy was developed and implemented in October 2018, targeting the largest social networks (a dedicated Facebook page and Twitter account). Individual coaches posted experiences and anecdotes from their own perspective, but within the themes identified. Social media usage metrics were extracted from August to November 2018.

Results/Outcome(s): All coaches were either current or previous stoma patients. 77% had a background of inflammatory bowel disease. The cohort had experienced a wide range of current and previous stoma issues and 92% had one or more active medical comorbidity. Themes identified for focus were mental health, physical activity, nutrition, travel with an ostomy, social wellbeing, understanding stoma complications and understanding stoma appliances. Up to November 2018 60% of Facebook users interacting with the 'Patient Coach' page were female and 14% were aged 55 or over. The 28-day reach of the Facebook page (the number of times content was viewed one or more times) increased from 0-10,375 impressions between August-September 2018 following recruitment of the 'Coaches'. Following implementation of the structured program in September 2018, engagement increased to 32,336 impressions with 5765 advanced interactions (commenting, 'liking' or accessing resources). Between August-November 2018, 445 Tweets were made from the 'Patient Coach' Twitter account generating 81,909 impressions. This included a 75% increase in impressions from 19,300 to 33,800 following the implementation of the structured program. All proposed themes were covered.

Conclusions/Discussion: Ostomy patients are a group who are known to suffer impaired health-related quality of life. Interventions based around education and empowerment have been demonstrated to improve outcomes in this group. Social media presents a unique platform to both educate and empower in a number of domains (3). We have demonstrated that, involvement of patient-peers in a social media intervention can increase engagement substantially. Such programs are improved further and sustained when a structured and focused program is implemented that involves patients in its design. The demographics suggest a higher level of acceptance amongst young women which may reflect empathy with the 'Patient Coach' team who were majority female. Patients over 55 were under-represented which may reflect social media usage more broadly. Future work will include the recruitment of more male coaches and reanalyzing content to be more acceptable and accessible to older and male patients. Further qualitative and quantitative evidence of impact on the patients' quality of life will also be collected. 1. Vonk-Klaassen SM, de Vocht HM, den Ouden ME, Eddes EH, Schuurmans MJ. Ostomy-related problems and their impact on quality of life of colorectal cancer ostomates: a systematic review. *Qual Life Res.* 2016;25(1):125-33.

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CHOOSING WISELY: REDUCTION IN CT-SCANS FOR PERIANAL ABSCESES.

W50

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Purpose/Background: Following an initiative by the American Board of Internal Medicine and American Society of Colon and Rectal Surgeons (ASCRS) to decrease unnecessary medical tests, we aimed to decrease the number of CT scans on patients presenting to the ED with perianal abscesses and assess the impact on costs and short-term outcomes.

Methods/Interventions: In this single institution IRB approved study, in a joint initiative with the ED, the colon and rectal surgery service was consulted for every peri-anal abscess presenting to the ED, prior to obtaining a CT-scan or performing a drainage. Criteria for obtaining a CT scan in cases of perianal abscess was developed based on the ASCRS Clinical Practice Guidelines (CPG), as follows: Equivocal examination: defined as presence of perianal pain in the absence of a clearly palpable area of fluctuation or induration including on digital rectal examination. Body habitus precluding a satisfactory examination was also included. Immunocompromised patients: Including but not limited to diabetes, hypertension, transplant recipients, patients with ongoing anti-neoplastic chemotherapy. Crohn's disease. Every batch of house-staff of the colon and rectal surgery service were specifically educated regarding the criteria and the decision to obtain a CT scan and that of drainage bedside versus in the operating room was vetted by a colon and rectal fellow and/or attending. The intervention was initiated in July, 2017. The data was collected retrospectively from January 1st, 2016 till October 31st, 2018. All encounters with first presentation of perianal abscess as primary diagnosis in the ED from were included. Patients

with recurrent abscesses, known fistulas, in-situ setons and previous anorectal procedures were not included. Patients without a follow up visit in the colon and rectal clinic or ED within 30 days after the index visit in the ED were excluded. A CT-scan was considered positive if the radiologist reported it as "abscess" or "fluid collection". A recurrence was defined as presence of or increasing fluctuance, erythema/induration, pain/tenderness or drainage within 30 days from the index procedure. Standard descriptive statistics were used to summarize the data, Fisher's exact test and chi-square test was used to test for significance of dichotomous data. $p = 0.05$ was assumed as the level of significance.

Results/Outcome(s): There were 509 patients with principal discharge diagnosis ICD code for "perianal abscess" between January, 2016 and October, 2018. Of them, 238 fulfilled our inclusion and exclusion criteria. There were 120 patients before the initiative (hereafter referred to as "before") and 118 patients following the initiative (hereafter referred to as "after"). The distribution of age, gender, immune status and BMI was not significantly different between the before and after groups. Forty-three (43 of 120; 35.8%) CT scans were performed before and 33 of 118, 28.0% in the after group, translating to a 7.8 percentage point decrease. With the billing for CT scans of the abdomen with IV contrast being \$2,550, a saving of \$19,890 was achieved in little over a year after the initiative in a just the subset of patients with perianal abscesses in this study. There was a statistically significant increase of the number of bedside drainages performed in the ED, 70/120 (58.3%) before and 83/118 (70.33%) after. A statistically significant decrease in the number of scans not fulfilling the ASCRS-CPG based indications used in this study was noted, with 25/43 (58.1%) and 7/33 (21.1%). There was no significant difference in the 30-day recurrence rate between those with a CT-scan and those without both before and after.

Conclusions/Discussion: This ABIM-ASCRS guided quality improvement initiative was successful in decreasing the total number of CT-scans and a statistically significant number of unnecessary CT-scans. Involvement of the colon and rectal surgery service led to a significant increase in bedside incision and drainage without a difference in the 30-day recurrence.

Table 1. Results Summary

A. Incidence of CT-Scans:			
	CT-done	CT not done	
Before	43/120 (35.8%)	77/120 (64.2%)	
After	33/118 (28.0%)	85/118 (72.0%)	
Chi-square test: $p = 0.19$			
B. Incidence of CT-scans meeting ASCRS-CPG based indications			
	Appropriate	Inappropriate	
Before	18/43 (41.9%)	25/43 (58.1%)	
After	26/33 (78.8%)	7/33 (21.1%)	
Chi-square test: $p < 0.01$			
C. Bedside/OR Drainage:			
	Bedside I & D	OR I & D	No drainage
Before	70/120 (58.3%)	28/120 (23.7%)	22/120 (18.3%)
After	83/118 (70.33%)	12/118 (10.2%)	23/118 (19.5%)
Chi-square test: $p < 0.01$			
D. 30-day recurrence:			
	CT-done	CT not done	
Before	5	6	
After	2	10	
Fisher's Exact test: $p = 0.19$			

SESSILE SERRATED POLYPOSI: NOT AN INHERITED GENETIC DISEASE.

W51

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Purpose/Background: Researchers have been searching in vain for an inherited mutation associated with sessile serrated polyposis (SSP). We hypothesize that this is because there is no consistent monogenetic inheritance associated with the syndrome; rather, it represents the severest part of the spectrum of phenotype caused by sporadic BRAF mutations combined with mucosal hypermethylation. The aim of this study is to 1) describe the phenotype of SSP, looking for features characteristic of Mendelian inheritance and 2) compare these features to patients with a single sessile serrated lesion (SSL).

Methods/Interventions: This is a single institution prospective cohort study using a database of patients with SSLs and a separate registry of patients with SSP. SSP was defined according to WHO Criteria Type I (≥ 5 serrated polyps proximal to the sigmoid, ≥ 2 of which are ≥ 10 mm diameter). Demographic, genetic, clinical, and family characteristics in the medical record were analyzed. Patients with SSP were compared with patients who had a single SSL.

Results/Outcome(s): There were 46 patients with SSP. Their mean age at diagnosis was 64.3 years (SD 8.86). 60.3% of them were either current or past smokers with a mean 27 pack year history. 36.2% of patients had a personal history of non-colorectal cancers including skin (melanoma and basal cell), prostate, pancreas, breast, thyroid, and renal cell cancers and leukemia. 31.9% of patients had a family history of colon cancer in first or second degree relatives, but these cancers were not young age of onset. Breast and prostate cancer were also common (family history of any cancer- 83.0%). 10 patients had genetic testing: 4 had negative panels, 1 had a pathogenic variant in *MSH2*, 1 an *IVS7* deletion in *PTEN*, 2 negative *APC* sequencing (1 negative *MYH*) and 1 pathogenic variant in *Chek2*. *RNF4* was not sequenced in any patient. One patient had ulcerative colitis. Results of the cohort comparison with non-syndromic single SSL patients (n=324) is shown in the table.

Conclusions/Discussion: SSP, with its late age of onset and lack of a cohesive spectrum of associated cancers, has few of the features of a traditional inherited syndrome.

Rather, the association with smoking suggests familial environmental factors play a role. SSP is not a hereditary polyposis syndrome.

THE CLINICAL UTILITY OF WATER-SOLUBLE CONTRAST ENEMA PRIOR TO STOMA REVERSAL.

W52

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Purpose/Background: Temporary diverting stomas are often utilized in the management of left sided colorectal anastomoses in an attempt to reduce the significant morbidity associated with anastomotic leaks. One of the most feared complications following stoma reversal is persistent leak or stricture which was present, but not clinically apparent prior to reversal. For this reason, water-soluble contrast enemas are frequently obtained to exclude the presence of persistent leak, stricture, or fistula. It may also be combined with in-office physical exam, endoscopy, or cross-sectional imaging for further evaluation prior to proceeding with stoma reversal. High quality evidence regarding the use of contrast enema in this setting is lacking, though it remains common practice. The purpose of this study was to evaluate the clinical utility of routine water-soluble contrast enema prior to stoma reversal.

Methods/Interventions: All patients who underwent water-soluble contrast enema as preoperative workup for stoma reversal at Los Angeles County + University of Southern California Medical Center from June 2015 to February 2018 were included in this study. Cases were retrospectively analyzed via chart review. The primary outcome of interest was the rate of identification of leak, stricture, or fistula on water-soluble contrast enema. Additionally, the type of stoma, indication for placement, pre-reversal complaints, physical exam, and any additional imaging or endoscopic studies obtained prior to the ultimate reversal operation were recorded and analyzed for trends and significance.

Results/Outcome(s): Water soluble contrast enema was performed in 161 patients. Leak, stricture, or fistula was reported by contrast enema in 11.8% of patients. Leak, stricture, or fistula was identified by means other than contrast enema in 4.3% of patients. Of those with a false negative contrast enema, 71.4% were associated with

W51 Comparison of sessile serrated polyposis patients to those with a single sessile serrated lesion

	Male:Female	Mean Age at Diagnosis (years)	Mean number of any polyp	% of patients with concurrent adenomas	% of Patients with Dysplasia	% with Family history of Colorectal Cancer	Personal Diagnosis of Colorectal Cancer
SSL	185:139	61.7	4.4	45.0%	4.0%	47 (14.5%)	14 (4.3%)
SSP	27:19	64.3	26.3	71.7%	19.6%	15 (31.9%)	5 (10.9%)

strictures and 28.6% were associated with leak. The sensitivity of water-soluble contrast enema for the detection of leak, stricture, or fistula was 68.18% (95% CI 45.13-86.14) and the specificity was 97.12% (95% CI 92.80-99.21). Eighty-four patients underwent endoscopy in addition to water soluble contrast enema. Endoscopy identified leak, stricture, or fistula formation in 22.6% of this cohort. The sensitivity of endoscopy for identification of leak, fistula, or stricture was 95.0% (95% CI 75.13-99.87) and the specificity was 100% (95% CI 94.40-100). Sixty-seven patients underwent computed tomography in addition to water soluble contrast enema. Computed tomography was positive for leak, stricture, or fistula in 37.3% of patients. The sensitivity for computed tomography for identification of leak, fistula, or stricture was 80.0% (95% CI 51.91-95.67) and the specificity was 75.0% (95% CI 82.36-97.31).

Conclusions/Discussion: Water soluble contrast enema prior to stoma reversal is highly specific but not sensitive for the detection of leak, stricture, or fistula. Conversely, endoscopy is highly sensitive and specific. Contrast enema may be safely omitted in patients who require endoscopic screening prior to stoma reversal.

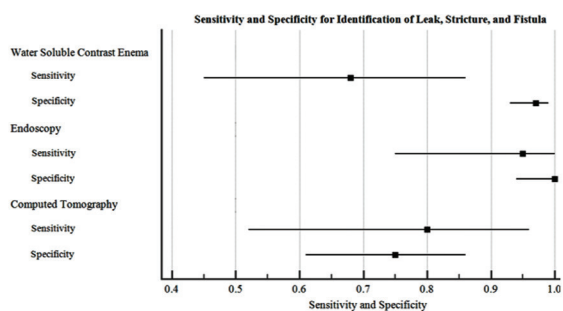


Figure 1: Sensitivity and specificity (with 95% confidence intervals) of water-soluble contrast enema, endoscopy, and computed tomography for the detection of leak, stricture, or fistula.

DOUBLE CHANNEL ENDOSCOPY, A USEFUL APPROACH TO ADVANCED ENDOSCOPIC POLYPECTOMY.

W53

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Purpose/Background: Endoscopic mucosal resection (EMR) of large colonic polyps provides an opportunity to spare patients the morbidity and mortality of a potential colectomy. While EMR is appealing it can be technically difficult and time consuming. This is especially true for broad flat lesions, those located over a fold, or those near the appendiceal orifice, where engaging a snare around the lesion can be challenging. Closure of broad polyps defects with current endoscopic clips is also hindered by the limited wingspan of the clip. We describe a novel technique for EMR and closure of mucosal defects utilizing a double channel endoscope and present our current outcomes.

Methods/Interventions: Our EMR approach employs a double channel endoscope, either a gastroscope for lesions distal to the splenic flexure or a colonoscope for more proximal lesions. Following an initial diagnostic colonoscopy to assess the lesion, a submucosal injection was performed to lift the polyp. This is followed by a grasp-and-snare technique, using a biopsy forceps in one channel to grasp the tissue and pull it above the snare in the second channel (Figure 1). Closure of broad defects with double channel endoscopy utilizes a biopsy forceps through one channel to grasp the far edge of the defect and drag it to the open endoscopic clip in the second channel, allowing for opposition of the edges and underlying tissue as the clip is deployed. To examine results of this method of EMR, a single center retrospective review was conducted of consecutive patients from November 2011 to November 2018 with known colonic polyps which were deemed not amenable to traditional polypectomy. All patients underwent an initial diagnostic colonoscopy in order to assess the lesion for potential malignancy and to determine suitability to an endoscopic approach. Inclusion criteria for the present study were those patients where the intent was to complete an EMR by double channel endoscopy after the initial diagnostic colonoscopy. Patients who were not able to undergo a successful EMR, requiring other endoscopic or surgical methods were included, as we wished to examine our EMR success and rate of conversion. Patient who were managed by other techniques such as endoscopic submucosal dissection, combined endoscopic laparoscopic surgery, or colectomy after the initial diagnostic colonoscopy were excluded from this study. Following successful EMR, follow up endoscopy is planned 6-12 months later.

Results/Outcome(s): A total of 32 patients were examined, with the study population having a mean age of 64 +/- 11 years, 53% were men, and a mean ASA of 2.3 +/- 0.5 was observed. Polyp distribution was 81% (26/32) in the right colon, 6% (2/32) in the transverse colon, 9% (3/32) in the left colon, 3% (1/32) in the sigmoid colon. Mean polyp size was 27 +/- 12 mm, with 81% (26/32) having a sessile morphology. All patients had a successful EMR with none requiring a step up to laparoscopic assistance or colectomy. Mean endoscopy time was 99 +/- 71 minutes, with 88% (28/32) completed with propofol infusion for sedation. Submucosal injection was performed in 94% (30/32) of cases, closure with endoscopic clips was completed in 84% (27/32) of cases, 13% (4/32) required no closure, and one defect (3%) was closed using an endoscopic suturing device. Large specimen pieces were pinned onto corkboard at the time of the procedure prior to histologic assessment. There were 5 post-procedure complications (16%); 4 patients experiencing crampy abdominal pain after colonoscopy consistent with "post polypectomy syndrome", all of whom were managed nonoperatively, and 1 bleeding episode managed with endoscopic clip placement. Final pathology showed adenomatous polyps in 72% (23/32) (16 tubular adenoma, 6 tubulovillous adenoma, 1 villous

adenoma), serrated polyps in 22% (7/32), and 2 specimens with cauterized tissue that could be further assessed. One patient had dysplasia with negative margins, and no invasive carcinoma was identified on final pathology. Follow up endoscopy is currently complete in 18/32 56% patients, with a mean time to follow up of 320 +/- 129 days. Recurrent adenoma was identified in 11% (2/18) at subsequent endoscopy; both were managed endoscopically with final pathology showing no malignancy.

Conclusions/Discussion: The use of a double channel endoscope for endoscopic mucosal resection provides an additional approach which can be utilized to potentially spare patients a colectomy in the setting of an “unresectable” polyp. By presenting our series utilizing this technique, we hope to increase awareness of this approach for both the resection of technically challenging polyps and the successful endoscopic closure of broad defects.

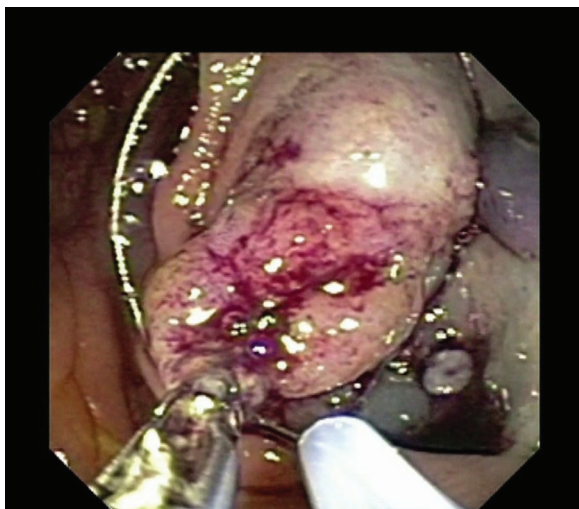


Figure 1. Use of a double channel endoscope to perform an EMR with grasp-and snare technique, with a biopsy forceps in one channel to grasp the tissue and pull it above the snare in the second channel.

COLONOSCOPY AFTER ACUTE DIVERTICULITIS, NECESSARY OR ANTIQUATED MEDICINE? A COMMUNITY-HOSPITAL EXPERIENCE.

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Purpose/Background: Diverticulosis is a wide spread disease among the Western world, contributed to by a low fiber diet, reaching an incidence of 65% by age 85⁽¹⁾. An extension of this disease is diverticulitis - the inflammation of the outpouchings of the colon, which contributes to increased patient morbidity and healthcare costs. Greater than 300,000 patients require hospitalization each year for symptoms of diverticulitis⁽¹⁾. The American Society of Colon and Rectal Surgeons (ASCRS) recommends patients to undergo a colonoscopy six-to-eight weeks after

resolution of acute diverticulitis to rule out other causes for their symptoms. Most notably to exclude malignancy, although this is given with low-quality evidence supporting this practice – a Level 1C recommendation.^(1,2)

Methods/Interventions: A retrospective chart review from 13 hospitals within a large national network over a two-year period was performed looking at findings from follow-up colonoscopy after a diagnosis of acute diverticulitis. Inclusion criteria included: Adults with a diagnosis of acute diverticulitis on CT scan with documentation, follow-up colonoscopy, and accessible pathology reports. Patients with a previous history of malignancy were excluded as were those who had suspected malignancy on imaging. In total, 900 patient charts were examined.

Results/Outcome(s): A mean age of 60.5 years(26-93) and mean BMI 25.7(17-69.8). In total, 93 patients had a documented family history of Colorectal Cancer. A total of six patients had a history of Inflammatory Bowel Disease. There were found to be five cases of adenocarcinoma, two were excluded for an ascending colonic mass and being described on CT prior to colonoscopy(0.33%). A total of 441 patients were found to have polyps. This included 200 tubular adenomas (22.2%), 46 serrated polyps (5.1%), 24 tubulovillous adenomas (2.6%), and 171 hyperplastic polyps (19%).

Conclusions/Discussion: The national incidence of all colorectal polyps approaches 35% with advanced adenomas at 0.5% in the screening population^(3,4,5). This is similar to our study presented here and a colonoscopy following acute diverticulitis may not be needed as there is no increase in post-diverticulitis incidence of malignancy. However, there is associated increased patient morbidity, healthcare cost, and use of healthcare resources to pursue follow up colonoscopy for these patients that can be safely avoided. Providers and patients should consider following regular colonoscopy screening guidelines independent of their recent diverticulitis diagnosis.

C REACTIVE PROTEIN (CRP) TRAJECTORY PREDICTS FOR THE LIKELY NEED OF INTERVENTION IN ACUTE DIVERTICULITIS.

W55

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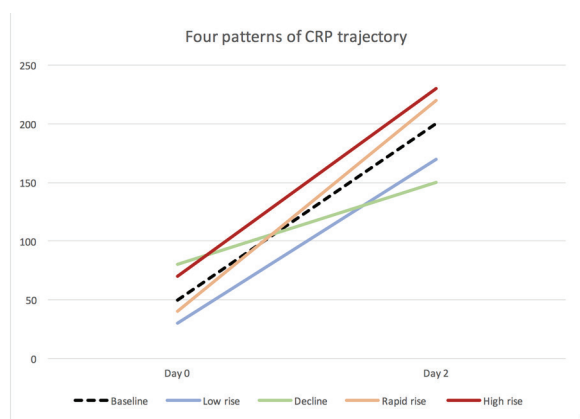
Purpose/Background: C reactive protein (CRP) is an important and clinically useful marker of inflammation and sepsis. This study's aim was to examine if the CRP trajectory can identify patients that may require intervention during an admission for acute diverticulitis.

Methods/Interventions: A retrospective review of all patients presenting with acute diverticulitis to a major tertiary referral hospital from January 2012 to August 2016 was conducted. Patients who underwent immediate operative management were excluded. The trajectory of

the rise relative to the median at Day 0 and Day 2 were analyzed to identify four patterns of change in CRP: 'Low rise' (levels below median at Day 0 and Day 2), 'High rise' (levels above median at Day 0 and Day 2), 'Rapid rise' (levels below median at Day 0 but above median at Day 2) and 'Decline' (levels above median at Day 0 but below median at Day 2). (see figure provided)

Results/Outcome(s): 456 patients were identified, 244 (53%) female. Intervention was required in 64 (14%) patients. Median CRP on Day 0, 1, 2, 3 and 4 were 55.7 (IQR 127), 142.4 (IQR 149), 221.2 (IQR 149), 218.9 (IQR 180), 142.8 (IQR 232) mg/L. There were 127 patients (38%) in the 'Low rise', 147 (44%) in the 'Decline', 25 patients (7%) in the 'Rapid rise' and 38 patients (11%) in the 'High rise' groups. Within these respective groups 5%, 8%, 24% and 32% of patients required intervention ($p = 0.002$).

Conclusions/Discussion: The C reactive protein trajectory during the initial 48 hours of admission in patients with acute diverticulitis can be useful in predicting the likelihood of needing intervention. Those most likely patients to need intervention have a rapid rise from below 50 mg/L at Day 0 to above 200 mg/L at Day 2 or a persisting high CRP above 50 mg/L at Day 0 to above 200 mg/L at Day 2.



MANAGEMENT OF NON-OPERATIVE DIVERTICULITIS: IS SURGICAL ADMISSION ALWAYS BEST?

W56

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Purpose/Background: Standardization of institutional treatment pathways allows for more efficient utilization of healthcare resources, aimed at improving patient care and experience. Recent retrospective analyses, as well as unpublished data from our institution, have demonstrated decreased hospital length of stay (LOS), direct costs, total costs, and thirty day readmission rates associated with initial admission of surgical disease (Gallstone disease and

Small Bowel Obstruction) to a surgical service. After a 6 month transition, in January 2017, we defined institutional pathways (IP) for Emergency Department admissions for Diverticulitis, mandating initial admission to a surgical service. Our study aimed to demonstrate that IP for non-operative diverticulitis would reduce hospital LOS, direct costs, total costs, and thirty day readmission rates.

Methods/Interventions: Patients with Emergency Department visits with primary ICD-10 diagnoses for diverticulitis at a single, tertiary care center between October 2015- June 2016 (unstandardized, control cohort) were compared to those admitted January 2017- September 2018 (post-implementation of surgical admission policy, IP cohort). Patients undergoing admission for non-operative management of diverticulitis (includes placement of percutaneous drainage catheter) were included in the study. Admission demographics (age, sex, ethnicity, insurance provider) were assessed. Primary outcomes included hospital LOS, direct cost, indirect cost, total cost, and thirty day readmission rates. Student's two tailed *t*-test and Chi Square analysis was utilized, with statistical significance of $P < 0.05$.

Results/Outcome(s): A total of 83 patients were admitted with acute diverticulitis in the control group (45 surgical, 38 medical). Non-operative management occurred in 61 (73%) of patients. Percutaneous drainage catheter insertion occurred in 7% of the non-operative control cohort. The proportion of patients undergoing non-operative intervention was similar between the two disciplines in the control cohort (28 surgical, 33 medical). One hundred and thirty one patients were admitted to the surgical cohort. Of those patients in the IP cohort, 111 (85%) were managed non-operatively. Fourteen percent of patients in the IP cohort underwent placement of a percutaneous drainage catheter. Patient characteristics were found to be similar amongst the two cohorts, except for a higher percentage of patients in the IP cohort utilizing private insurance (58% vs. 46%). Interestingly, patients initially admitted to a surgical team who received non-operative management for diverticulitis showed no difference in hospital LOS (3.8 vs. 4.2 days; $p=0.21$), direct cost (\$2639.44 vs. \$2809.36; $p=0.61$), and overall cost (\$5968.67 vs. \$5629.55, $p=0.60$). Thirty day readmission rates were comparable at 11% and 10% respectively. Given the increase in drainage catheter procedures in the IP cohort, we additionally sought to determine if this difference could account for the results obtained. Interestingly, exclusion of percutaneous drainage catheter insertion revealed no difference between cohorts for all primary outcomes (data not shown).

Conclusions/Discussion: Institutional policy mandating admissions for patient's receiving non-operative management of diverticulitis to a surgical service does not reduce hospital LOS and cost. This argues that admission to a medical service may be an acceptable practice, with surgical consultation and appropriate outpatient follow up. Although, this study is limited by nature of retrospective

review, and sample size, it raises the question is acute diverticulitis always a surgical issue? Further studies are warranted to delineate these interesting findings.

TREATMENT FAILURE AFTER CONSERVATIVE MANAGEMENT OF ACUTE DIVERTICULITIS: A NATIONWIDE READMISSION DATABASE ANALYSIS.

W57

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Purpose/Background: Recurrent colonic diverticulitis is a common condition that significantly impacts patients' quality of life and is responsible for substantial socioeconomic burden. The rates and predictors of treatment failure following conservative management of acute uncomplicated and complicated diverticulitis are not well described. The aim of this study is to describe the rates and predictors of treatment failure within 90-days after conservative management of an index admission with acute diverticulitis.

Methods/Interventions: After institutional review board exemption, data were obtained from the Nationwide Readmission Database (NRD) from 2010 - 2015. Adult patients (age ≥ 18) admitted with a primary diagnosis of acute diverticulitis (uncomplicated and complicated) who were managed conservatively and were discharged alive after their index admission were included. Patients who underwent any colectomy and/or colostomy during the first admission were excluded. A wash-in period of 3 months (exclusion of any patients admitted from January-March) and a wash-out period of 3 months (exclusion of any patients admitted from October-December) was used to ensure a new episode of diverticulitis and to allow for a minimum of 90-days follow up. Complicated diverticulitis was defined as acute diverticulitis with a concurrent diagnosis of an abscess, perforation, peritonitis, or requirement of percutaneous drainage. The primary outcome was overall treatment failure defined as unplanned readmission within 90-days. A multivariable logistic regression model was used to identify independent predictors of treatment failure.

Results/Outcome(s): Of 201,384 patients with acute diverticulitis managed conservatively who met inclusion criteria, 13,261 (6.2%) had treatment failure and 3298 patients (1.6%) underwent emergency surgery. On the index admission, mean age was 61.3 (± 16.0) years, 40.2% were males and 26,457 patients (13.0%) were admitted with acute complicated diverticulitis. Of the patients with an index attack of uncomplicated diverticulitis, 7287 (4.2%) had treatment failure with uncomplicated diverticulitis and of these 1190 (16.3%) required emergency surgery; and 2659 (1.5%) had a treatment failure with complicated diverticulitis and of which 1235 (46.4%) required subsequent emergency surgery. Amongst the patients with an

index complicated diverticulitis, 2225 (8.4%) had treatment failure with complicated diverticulitis and of these, 1166 (52.4%) required subsequent emergency surgery. On univariate analysis, patients with a treatment failure were similar in age, sex and co-morbidities compared to those without treatment failure. However, patients with treatment failure had significantly higher rates of an index complicated diverticulitis (24.2% vs 12.0%, $p < 0.01$), and longer hospital stay during the index admission (median 4.0 (IQR 3.0) vs (3.0 (IQR 2.0) days, $p < 0.01$). On multivariate regression analysis, significant predictors of overall treatment failure were an index admission with complicated diverticulitis (OR 2.07, 95% CI 1.98-2.16), discharge disposition after index admission (against medical advice at the index admission [OR 1.96, 95% CI 1.70-2.60] and home health care arrangements [OR 1.24, 95% CI 1.16-1.34]), longer length of index hospitalization (days) (OR 1.05, 95% CI 1.04-1.06), immunosuppression (OR 1.47, 95% CI 1.32-1.64), rheumatoid arthritis/vasculitis (OR 1.20, 95% CI 1.09-1.33), obesity (OR 1.11, 95% CI 1.06-1.17), drug abuse (OR 1.17, 95% CI 1.04-1.33), and alcohol abuse (OR 1.13, 95% CI 1.02-1.26)

Conclusions/Discussion: The overall rate of treatment failure following conservative management of diverticulitis is low, however those who have complicated diverticulitis at the index admission are at significantly higher risk of treatment failure. Other predictors of treatment failure included discharge against medical advice, immunosuppression, rheumatoid arthritis/vasculitis and obesity. Patients who have a treatment failure with complicated diverticulitis, regardless of the initial presentation, are at high risk of emergency surgery. Thus, patients at highest risk of treatment failure should be followed closely after the index presentation to ensure complete resolution.

PROSPECTIVE EVALUATION OF A STANDARDIZED ENHANCED RECOVERY PROTOCOL FOLLOWING ANORECTAL SURGERY.

W58

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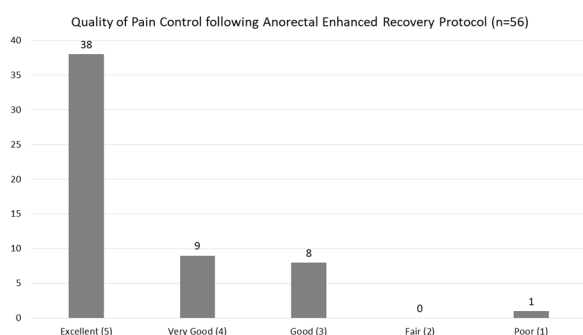
Purpose/Background: Surgery for anorectal disease is thought to cause significant postoperative pain. Our previous work demonstrated that most opioids prescribed following anorectal surgery are not used. We aimed to evaluate a standardized protocol for pain control following anorectal surgery.

Methods/Interventions: We prospectively evaluated a novel Anorectal Enhanced Recovery Protocol over a thirteen-month period for all patients undergoing elective anorectal surgery at our institution. Protocol components include preoperative query, procedural local-anesthetic blocks, first-line non-opioid analgesic use \pm opioid

prescription of five pills, and standardized postoperative instructions. Patients completed questionnaires at postoperative follow up. Patients with history of opioid abuse or use within 30 days of operation, loss to follow up, or surgical complications were excluded. Primary outcome was quality of pain control on a five-point scale. Secondary outcomes included use of non-opioid analgesics, opioids used, and need for refill.

Results/Outcome(s): 56 patients were included. Mean age was 47 ± 18 years with 24 (43%) women. Anorectal abscess/fistula procedures were the most common (68%) followed by pilonidal procedures (11%) and hemorrhoidectomy (7%). Most had general anesthesia (59%) with the remainder local anesthesia \pm sedation. 55 (98%) had procedural local-anesthetic blocks. 26 (46%) patients were prescribed opioids with a median of five pills. 47(84%) patients reported use of non-opioid analgesics. 47(84%) patients reported excellent to very good pain control (Figure). 220 opioid pills were prescribed and 122 were reported to be used. One patient (2%) received an opioid refill.

Conclusions/Discussion: Satisfactory pain control after anorectal surgery can be achieved with multimodality therapy with little to no opioid use for most patients.



COMPARISON OF LIFT VS BIOLIFT FOR THE TREATMENT OF TRANS-SPHINCTERIC ANAL FISTULA: A RETROSPECTIVE ANALYSIS.

W59

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Purpose/Background: Ligation of the intersphincteric fistula tract (LIFT) is a sphincter preserving technique for the treatment of anal fistula with a reported healing rate of 39.8-94.4%. The BioLIFT technique involves a LIFT plus the placement of a biological mesh in the intersphincteric plane. Advocates of this technique state improved healing rates, however evidence for this is lacking and this approach costs significantly more. This study aimed to compare the healing rates of BioLIFTs and LIFTs in a single center, multi-surgeon setting.

Methods/Interventions: This was a retrospective cohort study examining all adult patients who underwent a LIFT

or BioLIFT for a trans-sphincteric anal fistula at a tertiary care hospital over a 10-year period from April 2008 to April 2018. All adult patients with trans-sphincteric anal fistulas were included. Patients were excluded if they had inflammatory bowel disease or a previous attempt at repair. Surgeries were completed by seven colorectal surgeons. The primary outcome was healing of the fistula tract and secondary outcomes included complications and time to recurrence. Healing was defined as no evidence of recurrence with complete healing of both the external opening and intersphincteric incision. Multivariate logistic regression was used to compare healing rates for LIFTs and BioLIFTs while controlling for multiple patient and procedure related variables. A Kaplan-Meier survival analysis was performed to assess time to recurrence.

Results/Outcome(s): The total number of patients included was 134 (n = 86 for LIFT and n = 48 for BioLIFT). Patient groups were similar aside from a significantly higher rate of patients with a BMI >35 in the BioLIFT group (13.4 vs 27.7%, p = 0.02) and longer median follow up for the LIFT group (32.0 vs 15.7 weeks, p < 0.01). The healing rate was 80.4% vs 61.5% (BioLIFT vs LIFT, p = 0.03). After multivariate logistic regression the healing rate associated with a BioLIFT was found to be significantly better with an OR of 2.807 (95% CI 1.186-6.741, p = 0.02). The complication rate did not differ significantly (OR 1.555 [95% CI 0.696-3.474], p = 0.17). Kaplan-Meier analysis demonstrated no significant difference in the time to recurrence (p = 0.32).

Conclusions/Discussion: This is the largest study to date assessing the outcomes associated with the BioLIFT technique. In this single center experience with seven surgeons, we found that the BioLIFT technique was associated with a higher rate of healing without any significant difference in complications or time to recurrence. This study was limited by the retrospective nature and different lengths of follow up. The BioLIFT technique warrants further prospective studies to establish its benefits over the LIFT procedure.

WHAT DETERMINES PERFECT PATIENT EVALUATION OF SURGERY FOR HEMORRHOIDS – RESULTS OF PROSPECTIVE DOUBLE BLIND RANDOMIZED TRIAL.

W60

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Purpose/Background: The search for the best treatment for hemorrhoids is on-going. Patients tend to choose less effective but less invasive treatments, whereas most surgical trials report effectiveness as the most important end-point. Intrahemorrhoidal laser, or laser hemorrhoidoplasty (LHP), was first described in 2009. Our own experience suggested this method to be minimally invasive, safe and effective

procedure for symptomatic hemorrhoids. Doppler-guided hemorrhoidal artery ligation was compared to non-Doppler guided ligation - rectoanal repair (RAR) - in the randomized trial, with the latter being more effective in controlling prolapse after 6 months observation and significantly reducing cost of the procedure. Excisional hemorrhoidectomy (EH) is the most effective treatment with long and well documented history. The aim of this study was to identify factors, which are associated with perfect (10 out of 10) evaluation on visual analogue scale by the patients at the end of 1 year of follow-up of double-blind randomized trial.

Methods/Interventions: This is a randomized, parallel group double-blinded single centre prospective study. Patients with symptomatic 2nd or 3rd degree hemorrhoids, in 1st or 2nd risk group of ASA, who consented to participate in this study were included into the study. Detailed physical examination was performed with anoscopy and rigid proctoscopy in all cases. All patients filled a dedicated symptom questionnaire, which included questions on intensity and frequency of hemorrhoidal prolapse, bleeding, itching, pain and other symptoms. Every patient completed Wexner incontinence score, SF-36 and FIQOL questionnaires. The patients were randomized into three groups: LHP, RAR and EH. Computer based randomization sequence, patient blinding throughout the study, surgeon blinding preoperatively and surgeon-evaluator blinding postoperatively were used to reduce bias. LHP was performed using Ceralas diode laser of 1420 nm wavelength (Biolitec). Disposable LHP kit (Biolitec) was used, which contains sharp-tipped laser fiber and anoscope. Perianal skin immediately aboral to hemorrhoid was penetrated using needle-tip cautery. Laser fiber was introduced into the opening until the level of hemorrhoidal pedicle and coagulation was activated. 8 Watt 3 second pulses with 1 second pulse-pauses were used to coagulate the area of hemorrhoids. 5 mm of hemorrhoidal tissue is coagulated with one such pulse. 250 Joules was the upper limit of energy delivered per 1 hemorrhoidal quadrant. Smaller hemorrhoids were treated with less energy. The procedure was repeated in three other quadrants, thus treating all anal circumference. RAR was performed as described by Schurmann JP. For these patients, the ligations were placed in the area of visible pathologic hemorrhoidal tissue, and in patients with large prolapse mucopexy – lifting of prolapsing hemorrhoidal tissue with sutures was performed. Standard EH was performed up to the level of hemorrhoidal pedicle, with ligation or

suture-ligation of the pedicle and meticulous hemostasis. Each patient was followed up at 1 and 6 weeks and after 1 year after the operation with perianal examination, anoscopy (at 6 weeks and 1 year), symptom questionnaires (at 1 and 6 weeks and 1 year), Wexner incontinence score, FIQOL and SF-36 (at 1 year). Sample size calculation was performed using R statistical software package (©The R Foundation). Presuming the effect size of 0.3, power of 0.8 and alpha=0.05 the sample size was calculated to be 108 patients. To compensate for possible follow-up losses sample size was increased to 120 patients. Chi-square test and Anova tests were used to compare differences between the groups. Univariate analysis was performed to identify factors, which were associated with perfect evaluation of operation by the patients (10 out of 10 on visual analogue scale at 1-year follow-up visit) and stepwise multivariate linear logistic regression was performed to identify factors independently associated with the perfect evaluation by the patient.

Results/Outcome(s): One hundred and twenty one patients were included into the study: 40 into LHP group, 40 into EH group and 41 into RAR group from April 2016 to April 2017. One-year follow-up was completed in April 2018. All included patients participated in the scheduled visits and completed the follow-up as required per protocol. 52 patients rated their operation 0-9 and 69 patients rated their operation 10 on their follow-up visit. No recurrence of symptoms, less time to return to work and LHP were associated with increased possibility of perfect evaluation of the operation on univariate analysis. Results of multivariate analysis are presented in table 1.

Conclusions/Discussion: Laser hemorrhoidoplasty and no recurrence of symptoms are independently associated with increased possibility of perfect evaluation of operation by the patients at one-year follow-up.

W60 Results of multivariate analysis

Completely healthy	0,145
Time to return to work or regular activity	0,275
Recurrence*	0,045
Laser hemorrhoidoplasty	0,003
Recto-anal repair*	0,003
Excisional hemorrhoidectomy*	0,001

* - Significantly reduces the possibility of scoring treatment as 10 by patients

E-POSTER ABSTRACTS

NEOADJUVANT THERAPY RESISTANT LOCALLY ADVANCED RECTAL CANCER: WHEN TO JUMP SHIP?

P2

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Purpose/Background: While neoadjuvant therapy (NT) has an important role in controlling and downstaging locally advanced rectal cancer (LARC), a considerable portion of patients have NT resistant LARC. Identification of the factors associated with no response to NT may help physicians to seek further treatment alternatives or change modality of NT. This study aimed to identify the predictors and short-term outcomes associated with NT resistant LARC.

Methods/Interventions: Between May 2011 and November 2017, a total of 168 patients who underwent NT followed by total mesorectal excision for LARC in two tertiary referral centers were included to the study. Patients were divided in to two study groups regarding NT

response (Group 1: NT resistant and Group 2: complete response or partial response) and were compared based on the clinical characteristics and postoperative 30-day outcomes. NT resistant LARC was defined as the diagnosis of the same clinical and pathological stage of the patient regardless of the tumor regression grade.

Results/Outcome(s): NT resistance was seen in 85 (51%) patients with LARC. Age, gender, body mass index, clinical stage, and number of patients undergoing short- or long-course NT were comparable between the two groups (Table 1). The mean time interval between the end of NT and surgery was shorter in the poor response group (51 vs 58 days, $p=0.04$). The rate of postoperative morbidity was similar between the groups (21% vs 17%, $p=0.54$).

Conclusions/Discussion: While short interval appears to be a predictor for NT resistance in LARC, waiting longer than 9 weeks between the completion of NT and surgery seems inefficacious to seek further response to the standard NT modalities. Yet, NT resistance is not associated with worse histopathologic quality or increased perioperative morbidity.

P2 Patient characteristics and outcomes

	Group 1 (NT resistance, n=85)	Group 2 (cPR + pPR, n=83)	P value
Gender (Female), n (%)	28 (33%)	33 (40%)	0.36
Age, mean \pm SD	57 \pm 12	59 \pm 12	0.26
Body mass index, mean \pm SD	26 \pm 5	27 \pm 5	0.26
cTNM stage, n (%)			0.18
I-II	25 (29%)	17 (20%)	
III	60 (71%)	66 (80%)	
pTNM stage, n (%)			<0.0001
0	0	27 (33%)	
I	1 (1%)	35 (42%)	
II	11 (13%)	21 (25%)	
III	71 (84%)	0	
IV	2 (2%)	0	
Number of harvested lymph nodes, mean \pm SD	27 \pm 18	24 \pm 11	0.71
Incomplete mesorectum, n (%)	3 (3.6%)	4 (4.9%)	0.72
Type of neoadjuvant treatment, n (%)			0.14
Short term	27 (32%)	18 (22%)	
Long term	58 (68%)	65 (78%)	
Waiting period#, n (%)			0.35
> 63 days	25 (30 %)	30 (37 %)	
\leq 63 days	59 (70 %)	52 (63 %)	

Time interval between end of neoadjuvant therapy and surgery, both groups had missing data for one patient

cPR: Complete pathologic response

pPR: Partial pathologic response

NT: Neoadjuvant therapy

EVERY HOUR COUNTS: THE PRICE OF LONGER PROCEDURES ON PATIENT MORBIDITY IN COLON CANCER.

P3

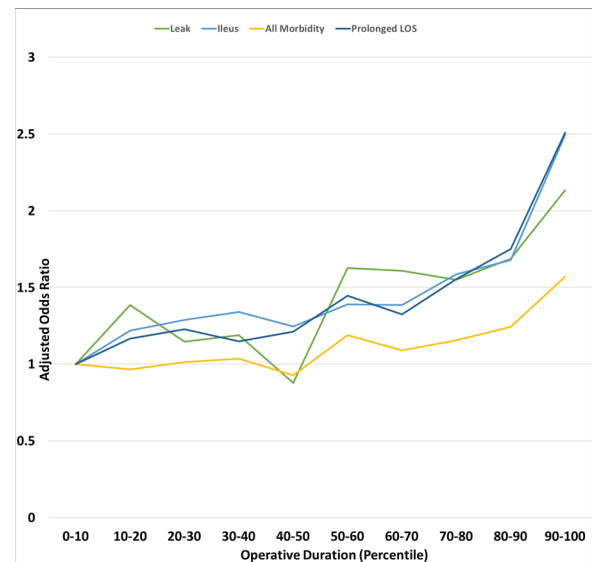
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Purpose/Background: Increased operative duration has been independently associated with increased morbidity in surgery. The impact of prolonged operative duration in patients undergoing colectomy for colon cancer remains unknown. The objective of this study is to determine if prolonged operative duration is associated with adverse events in colon cancer surgery.

Methods/Interventions: A retrospective cohort analysis was conducted between 2014 and 2016 using the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) colectomy targeted dataset. All patients undergoing segmental colectomy for colon cancer were identified. Patients undergoing a concurrent operation, subtotal colectomy, or with rectosigmoid/rectal tumors were excluded. The primary outcome measures included all-cause morbidity, anastomotic leak, post-operative ileus, length of hospital stay, and mortality. Multivariate analysis utilizing clinically relevant covariates was conducted to determine the adjusted effect of prolonged operative duration on the aforementioned outcome measures.

Results/Outcome(s): A total of 15,033 patients undergoing segmental colectomy for colon cancer were identified. The median operative duration was 142 minutes (IQR: 79 – 188 minutes). After adjustment for covariates on multivariate analysis (see figure 1), prolonged operative time, per hour, was associated with a 1.119 increased odds of all-cause morbidity (95%CI: 1.078-1.161, $p < 0.001$), 1.164 increased odds of anastomotic leak (95%CI 1.077-1.257, $p < 0.001$), 1.201 increased odds of post-operative ileus (95% CI: 1.151-1.254, $p < 0.001$), and 1.244 increased odds of prolonged length of stay greater than 5 days (95%CI: 1.201-1.289, $p < 0.001$). The overall rate of mortality was low ($n = 142$, 1.0%), and increased operative duration was not associated with increased odds of mortality (OR 0.985, 95%CI: 0.838-1.159).

Conclusions/Discussion: Prolonged operative duration is independently associated with increased rates of all morbidity, post-operative ileus, anastomotic leak, and length of hospital stay for patients undergoing colectomy for colon cancer. Further research exploring strategies to minimize surgical time, including the impact of involvement of surgical trainees, are needed to optimize patient outcomes and minimize adverse events.



PROGNOSTIC FACTORS IN LONG-TERM ONCOLOGIC OUTCOMES AFTER CURATIVE RESECTION FOLLOWING STENT INSERTION FOR OBSTRUCTING COLON CANCER.

P4

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Purpose/Background: This study analyzed the prognostic factors in long-term oncologic outcomes after curative resection following stent insertion for obstructing colon cancer: a multi-center retrospective study

Methods/Interventions: This retrospective study included 94 patients who underwent curative resection for obstructing left-sided colon cancer at four tertiary referral hospitals between June 2005 and December 2013.

Results/Outcome(s): The median follow-up periods were 48 months. The tumors were staged II in 49 (52.1) patients and III in 45 (47.9%) patients, respectively. The 5-year overall survival (OS) rates and 5-year disease-free survival (DFS) rates were 69.3% and 59.8%, respectively. Thirty patients (31.9%) had recurrence after surgery, with systemic recurrence in 25 patients (26.6%) and local recurrence in 5 patients (5.3%), respectively. Univariate analyses revealed that the histologic grade of tumor, the presence of perineural invasion, and the proportion of patients receiving postoperative adjuvant chemotherapy were significantly associated with OS and that the presence of perineural invasion was significantly associated with DFS. Multivariate analysis showed that sex (HR, 0.241; 95% CI, 0.069 to 0.850; $p = 0.027$), nodal stage (HR, 2.692; 95% CI, 1.034 to 7.009; $p = 0.043$), and the proportion of patients receiving postoperative adjuvant chemotherapy (HR, 0.215; 95% CI, 0.082 to 0.563; $p = 0.002$) were independent prognostic factors for OS and that the proportion of patients receiving postoperative

adjuvant chemotherapy (HR, 0.352; 95% CI, 0.149 to 830; $p=0.017$) was an independent prognostic factor for DFS.

Conclusions/Discussion: The proportion of patients receiving postoperative adjuvant chemotherapy was an independent prognostic factor for OS and DFS and these results suggest that adjuvant chemotherapy plays a significant role in the setting of stent insertion following curative resection for obstructed colon cancer.

A SURVEY OF PRACTICE PATTERNS IN ENDOSCOPIC TATTOOING.

P5

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Purpose/Background: Endoscopic tattooing is used to localize colonic lesions to facilitate identification during subsequent endoscopic procedures and during laparoscopic bowel resections. Despite its widespread use, official consensus regarding the specifics of the technique is lacking, potentially contributing to reduced quality in endoscopy and in overall patient care. This study assesses how endoscopists in Alberta conceptualize and approach the tattooing of colonic lesions. The goal is to identify current practice patterns and to look for ways to improve patient care.

Methods/Interventions: A survey was created with SurveyMonkey and distributed province-wide to practicing endoscopists, including general surgeons (with and without colorectal surgery fellowship training), gastroenterologists, general internists, general practitioners, and nurse practitioners. The survey evaluated the respondent's approach to a variety of clinical scenarios (such as synchronous, solitary, and anatomically well-defined lesions) and the respondent's application of certain technical factors (such as the number of tattoos per lesion, the location of tattoo relative to the lesion, whether or not saline is injected prior to tattoo ink). The survey also tracked the respondent's speciality, years in practice, practice volume, and procedure documentation.

Results/Outcome(s): The survey was completed by 38 endoscopists. The majority of respondents (30, 79%) have 5 or more years of experience, and many (18, 47.4%) perform > 500 colonoscopies per year. Most (24, 63%) perform colonoscopies in hospitals only, while the rest (14, 37%) perform colonoscopies in hospitals and in dedicated colon cancer screening centres. When presented with clinical scenarios, there was some variability as to which of the colonic lesions the respondents would tattoo. The most commonly agreed upon indications for endoscopic tattooing were: polyps that are highly concerning for a cancer (35, 92%), polyps with high-risk features (32, 84%), incompletely removed polyps (32, 84%), and polyps that are in anatomically indistinct locations (31, 82%). For the 3 clinical scenarios presented, 36% to 52% would tattoo, while 56% to 63% would not. Only a minority (13, 34%) felt that polyp size greater than 20 mm was an indication

for tattoo injection. The responses regarding technical aspects were the most divergent. Half of respondents (19, 50%) always inject saline before tattoo ink, but 15 (39%) selectively do, and 11 (29%) never do. The majority of respondents (24, 63%) only place tattoo distally, but 7 (18%) tattoo proximally and distally, and 2 (5%) only tattoo proximally. Regarding the number of quadrants in lumen which are tattooed, 9 (24%) tattoo only 1 quadrant, 13 (34%) do 2 quadrants, 13 (34%) do 3 quadrants, and 3 (8%) do 4 quadrants. Fortunately, the majority of endoscopists (30, 79%) always document the location of their tattoo, but many (8, 21%) inconsistently or rarely do.

Conclusions/Discussion: A province-wide survey of local endoscopists has demonstrated significant practice variability over a range of clinical scenarios and technical aspects regarding the tattooing of colonic lesions. This variability reflects the general lack of clear guidelines, and in practice it may increase the need for repeat colonoscopy or contribute to difficulty establishing surgical margins intraoperatively.

A PROPENSITY SCORE MATCHED COMPARISON OF SHORT-TERM PERIOPERATIVE OUTCOMES AFTER LAPAROSCOPIC AND ROBOTIC RIGHT COLECTOMIES: AN ANALYSIS FROM THE NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM DATABASE.

P6

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Purpose/Background: Due to the benefits of minimally invasive surgery, laparoscopic right colectomy (LRC) when technically possible has become the standard approach to right colon resections. However, in recent years with the acceptance of robotic surgery as a genuine minimally invasive alternative, robotic right colectomies (RRCs) are being increasingly performed. Multiple reports have shown it to be safe and feasible but comparisons to LRCs have been limited by small sample sizes and potential selection bias. We hypothesized that in well-selected patients undergoing a right colon resection the type of minimally invasive approach would not impact perioperative outcomes. Therefore, the aim of the current study was to assess and compare the short-term morbidity, mortality and outcomes of RRC and LRC in a contemporary national cohort.

Methods/Interventions: The National Surgical Quality Improvement Program (NSQIP) Procedure Targeted database was queried to identify patients who underwent a right colectomy between January 2013 to December 2017. Analyses were limited to patients who had elective surgery either with a laparoscopic or robotic approach. In order to account for preoperative differences that could impact outcomes, each robotic case was propensity score matched

to three laparoscopic cases by age, sex, diagnosis, BMI, year of operation, ASA class, smoking status and diabetes mellitus diagnosis. Data were examined using simple summary statistics, T-test, Mann-Whitney U test and two-proportions Z-test.

Results/Outcome(s): A total of 16,293 patients were identified of which 90% (14,659) underwent LRC, while 10% (1,634) had a RRC. The proportion of RRC to LRC increased from 4% in 2013 to 12% in 2017. All 1,634 robotic cases were successfully matched to 4,902 laparoscopic cases without any discarding. The median age, percent males, ASA ≥ 3 , diagnosis and comorbidities were similar between the two groups (Table). There was a statistically significant difference in the rate of major complications: 7% for RCCs vs 6% in LRCs ($p = 0.027$) mainly driven by a higher rate of return to OR for robotic cases. (Table) In a sensitivity analysis, where unmatched cases were compared, the difference remained significant, albeit smaller. Rates of minor complications and readmissions were not different between the two groups. As compared to LRCs, RRCs had a shorter median length of stay, but longer median operating times (3 vs 4 days, and 173 vs 131 minutes, respectively, both $p < 0.001$). The overall mortality was 0.4% for RRCs vs 0.5% for LRCs ($p = 0.365$).

Conclusions/Discussion: The incidence of serious perioperative morbidity after laparoscopic and robotic right colon resections is low, with no clinically relevant differences between approaches. Notwithstanding the limitations of the database, the number of robotic right colon resections have increased three-folds over 4 years in participating NSQIP hospitals. Despite longer operative times, RRC was associated with a shorter median LOS by one day compared to LRC. However due to the possibility of unadjusted confounders such as perioperative care pathways, this observation should be interpreted cautiously.

Table 1 – Comparison of patient demographics and perioperative outcomes between laparoscopic and robotic right colectomies.

	Laparoscopic (n = 4902)	Robotic (n = 1634)	p-values
Patient and disease characteristics			
Age (years) (mean (sd))	64 (14)	64 (14)	0.817
Gender (n = male (%))	2266 (46.2)	767 (46.9)	0.637
BMI (mean)	29.1	29.3	0.296
ASA Physical Status ≥ 3 (n (%))	2800 (57.1)	931 (57.0)	0.942
Diagnosis category (n (%))			0.980
Benign	1889 (38.5)	634 (38.8)	
IBD	323 (6.6)	108 (6.6)	
Malignant	2690 (54.9)	892 (54.6)	
Perioperative Outcomes			
Readmissions (n (%))	350 (7.1)	135 (8.3)	0.149
Length of stay (days) (median [IQR])	4 [3, 5]	3 [2, 5]	<0.001
Operating time (minutes) (median [IQR])	131 [101, 173]	173 [135, 218]	<0.001
Major complications (30 day) (n (%))			
Overall	280 (5.7)	118 (7.2)	0.027
Anastomotic leak	100 (2.0)	40 (2.4)	0.375
Organ space infection	133 (2.7)	50 (3.1)	0.516
Wound dehiscence	10 (0.2)	3 (0.2)	
Respiratory	47 (1.0)	16 (1.0)	1.000
Cardiovascular	50 (1.0)	27 (1.7)	0.055
Renal failure	12 (0.2)	3 (0.2)	-
Septic shock	34 (0.7)	10 (0.6)	0.861
Return to OR	125 (2.5)	61 (3.7)	0.016

IMPACT OF PERIOPERATIVE VARIABLES ACCORDING TO THE START TIME OF LAPAROSCOPIC COLORECTAL SURGERY.

P7

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Purpose/Background: The operation start time might be one of the many factors that can contribute to the patient's outcomes. The aim of this study was to evaluate the relationship between operation start time and patient outcomes in laparoscopic colorectal surgery.

Methods/Interventions: A series of patients who underwent elective colorectal surgery was analyzed from a prospective data base since January 2005 from June 2018. Patients were divided in two groups according to the start time of surgery. G1: 8am-12am and G2: 12:01 am-20 pm. At the same time the procedures were categorized in: Simple procedures (segmental resections and anterior resection) and complex procedures (total colectomies, total proctocolectomy, low anterior resection, abdominoperineal resection). Demographic data, hospital stay, type of complication, number of reoperations morbidity and mortality were analyzed.

Results/Outcome(s): A total of 1339 patients underwent laparoscopic elective colorectal surgery. 715 (54%) Were included in G1 and 624 (46%) in G2. The media age was 61 years. No differences between both groups were identified in demographic data. Time of surgery was lower in G2 with no statistically significant differences. Although simple procedures were performed more frequently in G2 (460 (73,7%) vs G1 (491 (68,7%)) $p < 0,04$) the rate of intraoperative complications was higher in this group (G2 (67 (10.7%)/G1:54 (7,6%) $p < 0.04$). However there no differences in conversion rate. The length of hospital stay was less in G1 (G1: 4,6, G2:5,5 $p < 0.001$). The most common complication was Clavien I in G1 (G1:135 (19%), G2:92 (14,7%), $p < 0,04$). Reoperations were more often in G2 (77(12,3%/G1:63 (9%)); $p < 0.03$. Mortality rates were higher in G2 (15 (2,4%)/G1 7 (1%) $p < 0.04$).

Conclusions/Discussion: Start time of surgery after 12 am generates an impact on patient's outcomes in laparoscopic colorectal surgery as the increased morbidity and mortality.

THE RELAPAROSCOPY THRESHOLD IN COLORECTAL SURGERY.

P8

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Purpose/Background: In the last few years there was an increased use of laparoscopic approach for colorectal surgery as well as the use of this approach to treat post-operative complications (re laparoscopy). Like in other procedures, re-laparoscopy in colorectal surgery requires a

learning curve. The aim of this study was to identify variables that determines the acquisition of the learning curve.

Methods/Interventions: A consecutive cohort of patients who underwent re-laparoscopy after colorectal surgery was analyzed from a prospectively collected database during the period 2002-2017. Patients were divided into two groups according to surgeon's experience: G1: less than five years of attending; G2: more than five years of attending. Demographics data, intraoperative complications, and postoperative outcomes were analyzed.

Results/Outcome(s): From a total of 1580 patients who underwent laparoscopic colorectal resection, 146 (9, 3%) required a re-operation. One hundred of them underwent a re-laparoscopy. The median age was 60.5 (27-92) years. There were no differences in demographic data and conversion rate between the groups. In G2 CT scan was used as diagnostic tool before re-laparoscopy with lower frequency {G1: 37 (74%) vs. G2 26 (52%); $p < 0.05$ }. There was a trend towards shorter time to decide the re-laparoscopy as well as shorter operative time in G2 ($p < 0.08$). There were no differences in length of hospital stay, post-operative morbidity and mortality rate.

Conclusions/Discussion: Experienced colorectal surgeons showed earlier time to decide the re-laparoscopy and shorter surgical time as compare to their younger counterparts. Time to re-laparoscopy and use of imaging studies to diagnose postoperative complications might be good indicators of reaching the learning curve in colorectal surgery.

EFFECTS OF IMMUNONUTRITIONAL INTERVENTION OF CHEMOTHERAPY AND GUT MICROBIOTA DEVIATION IN MICE COLON CANCER MODEL.

P9

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Purpose/Background: The most common side effect of radiochemotherapy for colorectal cancer is gastrointestinal complications, which are mainly manifested as gastrointestinal motility and intestinal flora disorder, together with gut barrier injury. Immune nutrients play an important role in nutritional support, immune regulation, intestinal flora and intestinal mucosal barrier function maintenance. Many studies have shown that immune nutrients combined with chemotherapy could contribute to the treatment of cancer. Immune nutrients supplementation can improve intestinal flora and gut barrier function in inflammatory bowel disease and partial hepatectomy animals. However, few studies have reported such results in chemotherapy-induced intestinal barrier injury, and its role in the treatment of colorectal cancer needs to be further studied. In this study we will explore the effect of different immune nutrients supplementation on the chemotherapeutic efficacy and the intestinal flora structure of tumor-bearing

mice by feeding chemotherapeutic mouse models with glutamine, n-3 polyunsaturated fatty acids, and prebiotics, which would lay a foundation for the application of immune nutrients in the clinical treatment of colorectal cancer.

Methods/Interventions: Thirty female BALB/c mice were subcutaneously injected with CT26 mouse colon cancer cells to construct a tumor-bearing mouse model. The tumor-bearing mice were randomly divided into five groups: Group 1 no chemotherapy intervention (Control, CON, $n=6$); Group 2 chemotherapy + saline group (Normal saline, NS, $n=6$); Group 3 chemotherapy+ glutamine intervention group (Glutamine, GLN, $n=6$); Group 4 chemotherapy+ n-3 polyunsaturated fatty acid intervention group (PUFA, $n=6$); Group 5 chemotherapy+ prebiotics intervention group (Prebiotics, PRE, $n=6$). Before (Baseline, BAS) and 2 weeks after intervention in each group, fresh stools were taken for DNA extraction and intestinal fecal microbiota was detected by 16S rRNA pyrosequencing. The tumor tissues were taken and tumor volume of mice was compared between the groups.

Results/Outcome(s): The levels of Firmicutes and Lactobacillus in feces of NS group mice receiving chemotherapy were significantly higher than those at baseline (BAS) and CON group, while Bacteroidetes and Bacteroides were significantly lower than baseline (BAS) and CON group mice ($P < 0.05$). The level of Bacteroidetes in feces of PUFA group was significantly higher than that of NS group, while Firmicutes and Actinobacteria were significantly lower than those of NS group ($P < 0.05$). There was no significant difference in fecal microbiota between the GLN group or PRE group and the NS group ($P > 0.05$). The tumor volume of mice in NS group, GLN group, PUFA group, and PRE group receiving chemotherapy intervention was significantly smaller than that of CON group without chemotherapy intervention ($P < 0.05$). In mice receiving immune nutrients supplementation, tumor volume of mice in PUFA group was significantly smaller than that of NS group ($P < 0.05$) and there was no significant difference in tumor volume between GLN group or PRE group and NS group ($P > 0.05$). Western blot results showed that chemotherapy or chemotherapy combined with immunonutrition significantly inhibited the expression of MMP2, COX2, and CyclinD1 in tumor tissues ($P < 0.05$).

Conclusions/Discussion: 5-Fu chemotherapy causes changes in intestinal flora of mice, reduced Bacteroidetes levels together with elevated Firmicutes levels. The n-3PUFAs supplementation can repair the imbalance of intestinal flora caused by chemotherapy, make the content of Bacteroides increased and the content of Streptomyces and Actinobacteria reduced, and increase the effect of chemotherapy.

HIGH TUMOR MUTATION BURDEN CORRELATES WITH COMPLETE RESPONSE TO NEOADJUVANT CHEMORADIO THERAPY IN PATIENTS WITH LOCALLY ADVANCED RECTAL CANCER.

P10

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Purpose/Background: Genomic alterations and tumor mutation burden (TMB) have been shown to have biological and therapeutic implications for colon cancer. However, their effects on locally advanced rectal cancer (LARC) are still unclear due to the paucity of pretreatment specimens. In this study, we profiled mutations in pretreatment biopsy specimens from LARC patients to identify genomic factors associated with tumor response to neoadjuvant chemoradiotherapy and survival.

Methods/Interventions: Patients with stage II or III rectal cancer, treated with total neoadjuvant therapy (5FU- based chemoradiotherapy, and either induction or consolidation neoadjuvant chemotherapy), were included. Complete response (CR) included both patients who had a pathological CR (pCR) after undergoing total mesorectal excision and also those who had a clinical CR (cCR) after undergoing watch-and-wait management for 2 years. DNA was extracted from the pretreatment tumor biopsy specimens. Mutational profiling was performed using Sanger sequencing and/or MSK-IMPACT, which is a next-generation sequencing assay of 420 cancer genes. Tumors that were positive for microsatellite instability (MSI) by PCR for the five-marker panel (BAT-25, BAT-26, MONO-27, NR-21, and NR-24) or had ≥ 20 mutations as determined by MSK-IMPACT¹ were categorized as MSI/TMB-high. Tumors that were negative for MSI by PCR or had < 20 mutations by MSK-IMPACT were categorized as microsatellite stable (MSS)/TMB-low. Comparisons were made using the student's t-test and chi-square test for continuous and categorical variables, respectively. Disease-free survival was analyzed separately using the Kaplan–Meier method.

Results/Outcome(s): Of the 320 LARC patients included in the analysis, 15 (5%) had MSI/TMB-high tumors. There was no difference in age, sex, or tumor distance from the anal verge between patients with MSI/TMB-high or MSS/TMB-low tumors, but the clinical stage ($p = 0.04$) was more advanced in MSI/TMB-high patients. Of the 15 MSI/TMB-high patients; 11 (74%) had mutations in the canonical DNA mismatch repair genes (*MLH1*, *MSH2*, *MSH6*, and *PMS2*), 2 (13%) had mutations in the DNA polymerase epsilon gene (*POLE*), and 2 (13%) had mutations in both. A total of 77 (24%) patients had a CR: 72 pCR and 5 cCR. MSI/TMB-high patients had a significantly higher CR rate compared to MSS/TMB-low patients (53% versus 23%, respectively, $p = 0.003$; Fig. 1). The 5-year rate of disease-free survival was 100% for MSI/TMB-high patients and 75% for MSS/TMB-low patients (log-rank $p=0.07$).

Conclusions/Discussion: MSI/TMB-high tumors are less frequent in LARC compared to colon cancer. MSI/TMB-high LARC patients are more likely to have a CR to neoadjuvant chemoradiotherapy and less likely to experience a relapse than MSS/TMB-low LARC patients. These findings could help better refine the criteria used to select LARC patients most appropriate for a watch-and-wait strategy. 1. Stadler, Z. K. *et al.* Reliable detection of mismatch repair deficiency in colorectal cancers using mutational load in next-generation sequencing panels. *J. Clin. Oncol.* (2016). doi:10.1200/JCO.2015.65.1067

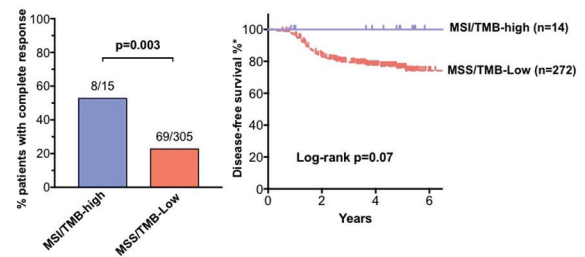


Figure 1. Rates of complete response (left panel), and disease-free survival (right panel) in patients with microsatellite instability/tumor mutation burden (MSI/TMB)-high or microsatellite stable (MSS)/TMB-low tumors. * Follow-up data were not available for 34 patients.

ZEBRAFISH EMBRYO AS AVATAR OF PATIENTS WITH COLORECTAL CANCER AND HEPATIC COLORECTAL METASTASIS: PRELIMINARY EXPERIENCE TOWARD A PERSONALIZED MEDICINE.

P11

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Purpose/Background: In the last years, a new concept of personalized medicine called 'Mouse Avatars' or 'co-clinical trials' has emerged, with the purpose to develop models to study the response of tumor to therapy on an individual basis. A big limitation of xenograft experiments in murine hosts is the requirement of immune-permissive strains and the long duration of time before the detection of human engrafted cells. We propose the use of rejection-free 0-5 days post fertilization (dpf) Zebrafish Avatars for patients affected by colorectal cancer (CRC) or colorectal liver metastasis (CRLM), in alternative to the expensive, time consuming and high ethical impact models of nude mouse xenografts. The aim of the project is to evaluate the usability of Zebrafish embryos as avatar and to test the chemosensitivity to the different chemotherapy schemes used for the treatment of patients affected by CRC or CRLM.

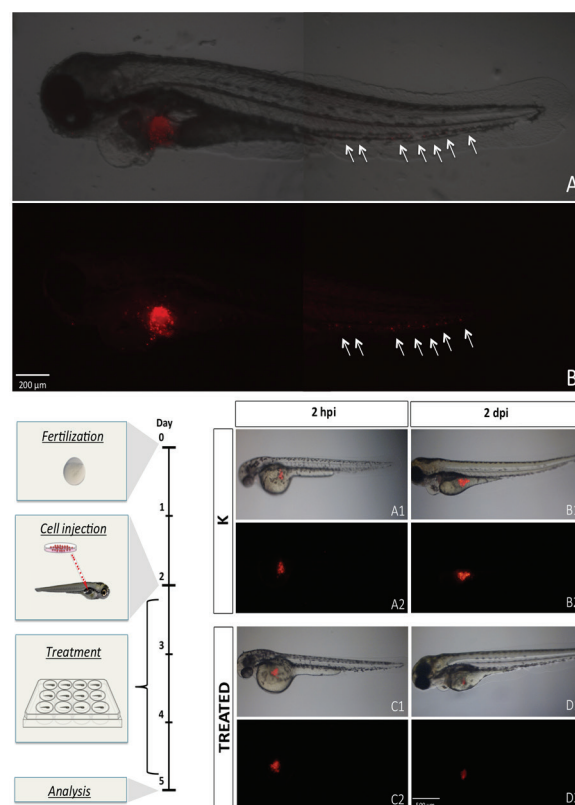
Methods/Interventions: For the purpose of the present study, patients with pre-operative histologically proven CRC or CRLM were prospectively enrolled. For each patient, a fragment of the tumor was taken after the specimen removal. After its elaboration, the tissue, fluorescently labeled with Dil, is pushed inside the yolk of 2 dpf zebrafish. At 2 hours post-injection (hpi) transplanted

embryos were distributed in 24-well plates and incubated in E3 media with the presence or absence of drugs. The transplanted embryos were exposed for 48 hours to the standard combinations of chemotherapy (CT) used for the treatment of CRC (5-FU, FOLFIRI, FOLFOX, FOLFOXIRI) added to E3 medium (treated grafted zebrafish embryos subgroups – treated-ZE subgroups). The control grafted zebrafish embryos subgroup (control-ZE) was exposed only to E3 medium. Each subgroup (control-ZE vs treated-ZE) were composed by 10 zebrafish embryos. For each protocol, the human plasma equivalent concentration was used as reference and we used a conversion factor human-to-fish calculated with a toxicity/efficacy study on the zebrafish model. Every day the fluorescent cancer cells were imaged by microscopic observation to evaluate the effect of the drug of interest. We used mass progression/regression as primary measure and cell migration along the zebrafish embryos' body and tail as secondary measure. A ratio between the tumor mass area at 2 hpi and 48 hpi was calculated for each ZE subgroup and compared to each other. The percentage of cell migration revealed in the grafted zebrafish of the control-ZE subgroup was compared with the percentage revealed in each treated-ZE subgroup. A $p < 0.1$ was considered statistically significant.

Results/Outcome(s): Ten patients with CRC (CRC group) and two patients with CRLM (CRLM group) were enrolled between January 2018 and November 2018. In all cases of both groups the tumor cells successful grafted in the yolk sack of zebrafish embryos and in the control-ZE subgroup the tumor mass increased at 48 hpi respect 2 hpi in all cases. The mass progression/regression analysis revealed a statistically significant difference of tumor mass progression in the treated-ZE subgroups respect the control-ZE subgroup in 4/10 cases (40%) of CRC group and 2/2 (100%) cases of CRLM group. In the CRC group, one CT scheme was statistically more efficient in 2/10 cases, two CT schemes in 1/10 case and three CT schemes in 1/10 case. In the CRLM group, one CT scheme was statistically more efficient in 1 case while in the other case two CT schemes resulted more efficient. Cell migration was detected in a percentage of grafted zebrafish embryos of the control-ZE subgroup in 7/10 cases (70%) of CRC group and in 2/2 cases (100%) of CRLM group. A significant reduction of the cell migration percentage in the treated-ZE subgroups compared to the control-ZE subgroup was revealed for almost one CT scheme in 7/7 cases of CR group and in 2/2 cases of CRLM group. In the CRC group, the reduction of cell migration percentage was revealed for one CT scheme in 3/7 cases, for two and three CT schemes in 1/7 case and for all CT schemes in 2/4 cases. In the CRLM group, the reduction of cell migration percentage was revealed for three CT schemes in one case and for all in the other case.

Conclusions/Discussion: In our experience, zebrafish embryos could be a model as avatar for oncological patients because in all cases the tumor cells successful grafted in the yolk sack of zebrafish embryos. Probably the protocol used for the tests of chemosensitivity should be improved and better

defined the human-to-fish dose. Since we have noticed a tendency to inhibit the tumor cells proliferation by the CT treatments, without reaching statistically significant, we have already tried to increase the CT doses with the intent to reach it. Moreover, a prospective co-clinical trial is under way to evaluate the concordance between the results of tests in zebrafish and the response to CT in oncological patients.



Representative case of patient's cancer cells spreading through the embryo body. A Overlay of fluorescent and DIC images, and B fluorescence image of the grafted embryo at 1dpi. White arrowheads indicate the migrating cells (Dil stained) in the area of the posterior caudal vein plexus. C Scheme of the *in vivo* experiment carried out by transplanting zebrafish embryos with cancer cells to investigate the efficacy of chemotherapy equivalent dose. At 2 hpi the embryos were exposed to chemotherapeutics. A representative image of control (A1/2-B1/2) and treated (C1/2-D1/2) embryos after 1 hpi and 2 dpi. Qualitatively images show tumor progression in control group and tumor regression in xenotransplanted embryos treated with chemotherapy.

CO-EXPRESSION OF COMP, SFRP4, LEF-1 AND PDGFRB INDICATES WORSE SURVIVAL FOR COLON CANCER PATIENTS ESPECIALLY IN THE YOUNG.

P12

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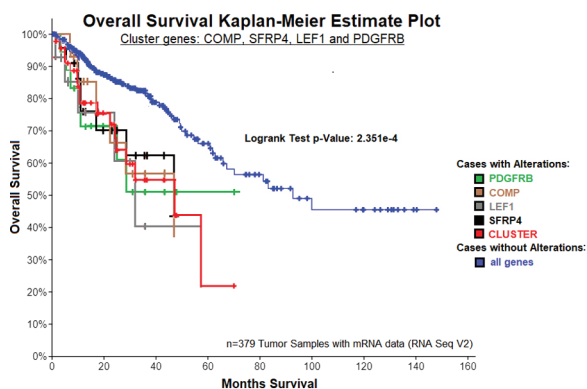
Purpose/Background: The overall incidence of colon cancer (CC) has decreased in the last several decades. However, the incidence in young patients has significantly increased. CC in the young presents at an advanced stage and tend to have more aggressive features. Expression of Cartilage Oligomeric Matrix Protein (COMP), Secreted

Frizzled-Related Protein 4 (SFRP4), Lymphoid Enhancer Factor 1 (LEF-1) and Platelet Derived Growth Factor Receptor Beta (PDGFRB) have been shown to confer CC aggressiveness. These genes are overexpressed in early-onset CC. The aim of this study is to elucidate the association between the co-expression of these genes and overall survival.

Methods/Interventions: CC tissues and matching noninvolved tissues from 6 early-onset and 6 late-onset CC patients were obtained from pathology archives. Deparaffinized tissues were macro-dissected from FFPE sections, RNA isolated, and used for expression profiling of 770 cancer-related genes. Survival analysis was performed using the cBioPortal for cancer genomics using 379 CRC patients extracted as a subset of the TCGA COADREAD database. The data, gene-level transcription estimates, are shown as $\log_2(x+1)$ transformed RSEM normalized count.

Results/Outcome(s): Gene expression profiling of 770 cancer related genes revealed statistically significant (p -value less than 0.05) overexpression of COMP, SFRP4, LEF-1 and PDGFRB in early-onset CC group compared to late-onset group. All four genes showed significantly poorer overall survival when they were queried individually with Logrank test p -values as followed: COMP=0.0413, SFRP4=0.0277, LEF-1=0.00306 and PDGFRB=0.0212. When they were queried as a group, the decrease in overall survival was more profound with Logrank test p -value 0.000235.

Conclusions/Discussion: COMP, SFRP4, LEF-1 and PDGFRB are individually significantly overexpressed in early-onset colon cancer and are associated with poorer survival. When these genes are co-expressed, the overall survival is significantly worse. These clusters of genes when co-expressed are potential prognostic biomarkers for early-onset colon cancer and aggressive colon cancer in general.



RECENT ADVANCES AND COMPARISON OF DIFFERENT FISTULA-IN-ANO CLASSIFICATIONS: HAS THE PROBLEM BEEN SOLVED?

P13

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Purpose/Background: Classification is done to grade the disease according to severity and guide regarding its management. There are four classifications published for fistula-in-ano- Parks¹(1976), St James university hospital(SJUH)²(2000) and Standard Practice Task Force (SPTF)³(2005) classification and a recent Garg⁴(2017) classification. Considering there is lot of confusion regarding management of fistula-in-ano, the objective of the study was to ascertain as which classification is most relevant and useful to the operating surgeon.

Methods/Interventions: The basis, methodology, utility(correlation with disease severity and guidance regarding disease management) and strong points of each classification were analyzed.

Results/Outcome(s): All the classifications are compared in Figure-1. Parks and SPTF were based on clinical experience, SJUH was MRI based and Garg was based on both clinical experience and MRI. Parks and SJUH did not correlate with disease severity whereas Garg and SPTF correlated well with disease severity. Whereas Parks, SJUH and SPTF were not validated by patient data, Garg classification was validated by patient data (440 patients). Whereas Parks, SJUH and SPTF had no role in the disease management, Garg classification guided the operating surgeon regarding the treatment of all types of anal fistulas. Garg grade I-II are simple fistulas and can be safely managed by fistulotomy without any risk to continence whereas Garg grade III-V are complex fistulas and fistulotomy should not be even attempted in these fistulas. The latter may be dealt with sphincter saving procedures like advancement flap, Anal Fistula Plug, LIFT or VAAFT. Thus this classification guides a general surgeon regarding the fistulas (grade I-II) which can be easily managed and the fistulas (grade III-V) that need to be referred to an expert. The latest radiological modalities like MRI and TRUS(transrectal ultrasound) are quite accurate for imaging fistulas. But their utility is limited significantly when proper classification is not used. Fistulotomy is the simplest and the most commonly done operation for fistula-in-ano with success rate of 90-98%⁵. But due to lack of proper classification, fistulotomy is grossly underutilized⁵. The operating surgeon is always fearful of incontinence and doesn't do fistulotomy even in low fistulas (involving less than one-third of sphincter complex). Due to this, these patients with low fistulas end up getting operated with procedures with much less success rate⁵. The onus of guiding the operating surgeon about the fistula complexity lies with the radiologist. But even the accurate description of fistula on MRI/TRUS by the radiologist, in the absence of proper classification, doesn't help the operating surgeon

in the management⁵. Due to this, the importance and utility of MRI and TRUS are not fully realized by the surgeons.

Conclusions/Discussion: Garg classification is a significant advancement over existing classification (Parks, SJUH & SPTF) with regard to accuracy and utility to the operating surgeon. It classifies the fistulas accurately as per disease severity as well as guides the operating surgeon regarding the disease management. The use of proper classification also enables the surgeon to harness the utility/advantages of latest diagnostic modalities like MRI and TRUS. Therefore, Garg classification should be used by radiologists and the surgeons.

References (1) Parks A. G. et al(1976) A classification of fistula-in-ano. *Br J Surg* 63:1-12 (2) Morris J. et al(2000) MR imaging classification of perianal fistulas. *Radiographics* 20:623-635 (3) Whiteford M. H. et al(2005) Practice parameters for treatment of fistula-in-ano (revised). *Dis Colon Rectum* 48:1337-1342 (4) Garg P(2017) Comparing existing classifications of fistula-in-ano in 440 operated patients: Is it time for a new classification? *Int J Surg* 42:34-40 (5) Garg P(2018). Is fistulotomy still the gold standard in present era and is it highly underutilized?: An audit of 675 operated cases. *Int J Surg* 56: 26-30.

FIGURE-1: The Fistula-in-ano classifications

Classifications	Garg	Parks	St James University Hospital (SJUH)	Standard Practice Task Force (SPTF)
Grade I	-LOW fistula with a linear tract (intersphincteric or transsphincteric)	Intersphincteric	Simple Intersphincteric	Simple (in which fistulotomy is possible without risk of incontinence) which have fistula involving less than one-third of sphincter
Grade II	-LOW fistula with multiple tracts or abscess (intersphincteric or transsphincteric)	Transsphincteric	Complex Intersphincteric	
Grade III	-HIGH Transsphincteric fistula with a linear tract -Fistula with associated comorbidities*	Supralevator	Simple Transsphincteric	Complex (in which fistulotomy has high risk of incontinence). These include high fistula, supralevator fistula, fistula with multiple tracts, horseshoe tracts, anterior fistula in a female and fistula with associated abscess, Crohn's disease, malignancy and existing continence disturbance
Grade IV	-HIGH Transsphincteric fistula with multiple tracts or abscess or horseshoe tract	Extrasphincteric	Complex Transsphincteric	
Grade V	-HIGH Transsphincteric fistula with intersphincteric -Supralevator extension or -Suprasphincteric fistula or -Extrasphincteric fistula		Supralevator	

LOW Fistula- less than 1/3 of external sphincter involvement, HIGH Fistula->1/3 sphincter involvement
*Comorbidities- Associated Crohn's disease, sphincter injury, post radiation exposure or anterior fistula in a female

RECURRENT DIVERTICULITIS: IS IT ALL IN THE FAMILY?

P14

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Purpose/Background: To date, only one study has assessed the impact of family history (FH) of diverticulitis on the risk of recurrent diverticulitis. The purpose of this study was to evaluate the association between a positive FH and recurrent diverticulitis after an episode of diverticulitis managed non-operatively.

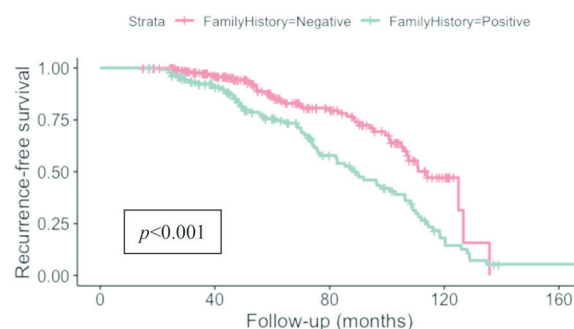
Methods/Interventions: After Institutional Review Board approval, all patients with CT-proven left-sided diverticulitis who were managed non-operatively at our institution from 2007-2017 were identified. Patient demographics and comorbidities were gathered from review of the medical charts. All CT scans pertaining to the index episode of diverticulitis were reviewed by a blinded expert gastrointestinal

radiologist. A detailed telephone follow-up questionnaire was conducted to assess for the presence of a positive FH of diverticulitis (defined as a first and/or second degree relative with a history of diverticulitis) and the number of relatives with a history of diverticulitis. The primary outcome was recurrent diverticulitis, defined as an episode of diverticulitis occurring >60 days following the index episode. A multiple Cox proportional hazards model was used to assess for an association between a positive FH and recurrent diverticulitis, adjusting for age, sex, Charlson Comorbidity Score >2, personal history of diverticulitis, immunosuppression, extraluminal air, abscess, and inflammatory segment >5cm.

Results/Outcome(s): Of the 500 identified patients, 340 were reached by telephone and completed the questionnaire (response rate: 68.0%). Among them, 137 (40.3%) had a positive FH of diverticulitis and 203 (59.7%) had a negative FH. A positive FH was more often attributed due to a first-degree relative (114/137, 83.2%) rather than a second-degree relative (10/137, 7.3%), while 13 patients had both a first- and second-degree relative with a history of diverticulitis (13/137, 9.5%). Compared to patients with a negative FH, patients with a positive FH were similar in median age (61.0 vs. 59.0 years, $p=0.57$), proportion of males (43.6% vs. 46.3%, $p=0.93$) and proportion of patients with a Charlson Comorbidity Score >2 (40.9% vs. 39.9, $p=0.95$). There were also no significant differences in radiologic characteristics, such as the presence of extraluminal air (15.3 vs. 19.8, $p=0.26$) and abscess (16.8% vs. 10.8%, $p=0.15$). After a median follow-up of 59.3 (39.7-90.3) months, patients with a positive FH had a significantly higher incidence of recurrent diverticulitis (56.9% vs. 22.2%, $p<0.001$) and worse recurrence-free survival (log-rank test: $p<0.001$) (Figure 1). Among patients with a positive FH, the presence of >1 relative with a history of diverticulitis was significantly associated with a higher incidence of recurrence compared to the presence of 1 relative only (43/51, 84.2% vs. 35/86, 40.7%, $p<0.001$). On Cox regression, a positive FH remained associated with a higher risk of recurrent diverticulitis (HR: 1.93, 95% CI 1.31-2.86, $p<0.001$).

Conclusions/Discussion: After an episode of diverticulitis managed non-operatively, patients with a positive FH of diverticulitis are at higher risk for recurrent diverticulitis. A thorough FH of diverticulitis should be obtained when counselling patients regarding the risks of recurrent diverticulitis and the indications for elective colectomy.

Figure 1 – Kaplan Meier curve comparing recurrence-free survival between patients with a positive family history of diverticulitis and patients with a negative family history



IMPACT OF IMMUNOSUPPRESSION ON MORTALITY AND MAJOR MORBIDITY FOLLOWING SIGMOID COLECTOMY FOR DIVERTICULITIS: A PROPENSITY-SCORE WEIGHTED ANALYSIS OF THE NATIONAL INPATIENT SAMPLE.

P15

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Purpose/Background: The management of acute diverticulitis in immunosuppressed patients is controversial. The appropriate timing and need for elective colectomy is increasingly debated. This study aims to assess the impact of immunosuppression on the outcomes of sigmoid colectomy for acute diverticulitis in emergency and elective settings using a large national discharge database.

Methods/Interventions: After institutional review board exemption, we identified adult patients (≥ 18 years of age) who underwent open or laparoscopic sigmoid colectomy or left hemicolectomy with or without colostomy for a primary diagnosis of acute diverticulitis using data obtained from the National Inpatient Sample (NIS) database from 2005 – 2015. Immunosuppression was defined as any of the following: (1) History of long-term steroids use, (2) History of solid organ transplant, (3) Diagnosis of immune deficiency (congenital or acquired), (4) Diagnosis of End-Stage Renal Disease or being dialysis dependent (5) Severe blood disorders that resulted in bone marrow failure, myelofibrosis, severe myelodysplastic syndrome, pancytopenia, leukopenia or neutropenia (6) Acquired immunodeficiency syndrome (AIDS). The primary outcome was the in-hospital mortality rate. Secondary outcomes included postoperative in-hospital major morbidity, length of stay and re-intervention rates (second laparotomy, closure of wound dehiscence and post-operative percutaneous drainage). Doubly robust propensity-score adjusted regression analysis was used to evaluate the impact of immunosuppression on these outcomes taking into account significant confounders including age, sex, Charlson Comorbidity Score (CCS), other comorbidities, complicated diverticulitis, operative approach, and presence of a stoma.

Results/Outcome(s): Of 109,705 included patients, 44,000 patients (40.1%) underwent an emergency sigmoid colectomy (Immunosuppressed 1,749 (4.0%) and immunocompetent 42,251 (96.0%)), while 65,705 patients (59.9%) underwent an elective colectomy (Immunosuppressed 2,877 (1.3%) and immunocompetent 64,828 (98.7%)). Immunosuppressed patients were significantly older (64.2 (IQR 12.6) vs. 58.2 (IQR 13.7) years, $p < 0.01$), had higher rates of complicated diverticulitis (50.0% vs. 39.2%, $p < 0.01$) and greater CCS ≥ 2 (71.8% vs. 9.5%, $p < 0.01$) compared to immunocompetent patients. In the emergency setting, unadjusted mortality and major morbidity

rates were significantly higher amongst immunosuppressed patients compared to immunocompetent patients (6.7% vs 2.3%, $p < 0.001$; 45.9% vs. 32.7%, $p < 0.01$, respectively). Using a propensity-score adjusted multivariable analysis, the odds of mortality and post-operative morbidity were significantly greater amongst immunosuppressed compared to immunocompetent patients (OR 2.16, 95% CI: 1.70-2.75 and OR 1.26, 95% CI 1.12-1.42 respectively). In addition, the median length of stay was significantly longer (1.01 days, 95% CI 0.67-1.42) amongst immunosuppressed compared to immunocompetent patients. In the elective setting, unadjusted mortality and major morbidity rates were significantly greater amongst immunosuppressed patients compared to immunocompetent (1.8% vs 0.2%, $p < 0.01$; 27.4% vs. 16.3%, $p < 0.01$, respectively). Using a propensity-score adjusted multivariable analysis, immunosuppression was associated with significantly increased odds of mortality (OR 3.61, 95% CI 1.97-6.64) and post-operative morbidity (OR 1.29, 95% CI 1.09-1.53). The absolute adjusted risk for mortality and post-operative morbidity in the immunosuppressed population, when anchoring the age at 60 years old, was greater in the emergency compared to the elective setting (mortality 2.3% vs 0.2%, morbidity 22.0% vs 15.0%, respectively), and significantly greater than for immunocompetent patients in each setting (mortality 1.0% vs $< 0.01\%$ and 18.0% vs 12.0%, respectively). Immunosuppression did not significantly increase the odds for re-intervention in either emergency or elective settings.

Conclusions/Discussion: Immunosuppressed patients were at significantly increased risk of mortality and major morbidity following emergency colectomy for diverticulitis compared to immunocompetent patients. Mortality rates following elective colectomy in the immunosuppressed patients were significantly greater than for immunocompetent patients, however the absolute risk of mortality was not prohibitive for elective surgery. Nonetheless, elective prophylactic colectomy should be offered to those immunosuppressed patients who are considered to be at high risk of recurrent diverticulitis as the risk of morbidity remains high.

FAT GRAFTING: A NOVEL TECHNIQUE FOR DIFFICULT OSTOMY MANAGEMENT.

P16

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Purpose/Background: Stomas are common surgical procedures that have a wide range of complications. One of the challenges that is frequently encountered by surgeons and patients include having durable stoma appliance seal that may lead to loss of skin integrity and ulcerations. Irregularities in parastomal skin contour secondary

to scarring, wound contraction, and change in weight and body habitus are major culprits for leaks. We report our experience with five patients who underwent fat grafting for difficult stoma to improve skin contour and ostomy care.

Methods/Interventions: The patients who underwent peristomal fat grafting to assist with improving ostomy appliance seal were identified with review of operative records. The procedure was performed under general endotracheal anesthesia. After tumescent infiltration, liposuction of the abdomen was performed through multiple small incisions. The location and volume of liposuction was determined based on patient body habitus and parastomal deformity. Harvested adipose tissue was washed and filtered, and filled in 10 mL syringes. Fat was injected around the stoma in small aliquots until adequate contour was achieved. We frequently over-corrected the parastomal depressions to account for the 50% anticipated loss of the fat grafted over time. Medical records were reviewed to assess the improvement of postoperative stoma care.

Results/Outcome(s): Five patients underwent parastomal fat grafting from February 2017 to June 2018. Two patients had an end-ileostomy, one had a loop ileostomy, one with a chronic enterocutaneous fistula with ostomy appliance, and one patient had a urostomy. An average of 226 mL adipose tissue was harvested (range: 120 - 350 mL), and 102.5 mL was grafted (range: 58-230 mL). One patient had near complete resolution of leaks after the surgery and no major issues were reported after one year from the procedure. Two patients had major improvement of appliance seal with short-term follow up with relapse of leakage after several months. Two patients had partial improvement in seal when compared to continuous leakage preoperatively. No complications were related to the procedure.

Conclusions/Discussion: Fat grafting is a novel and safe technique that could provide a solution for difficult stoma. This is especially useful when patients have prohibitive risks to have further transabdominal procedures. Larger sample size and long-term follow up will be needed for further assessment of the outcomes.

CAN STAPLER HEMORRHOIDECTOMY BE CONSIDERED AS A GOLD STANDARD FOR TREATMENT OF GRADE 3 AND GRADE 4 HEMORRHOIDS? A STUDY AND REVIEW.

P17

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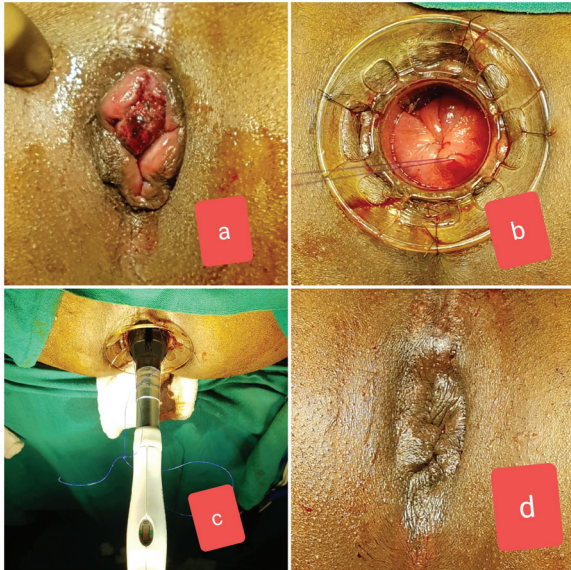
Purpose/Background: Hemorrhoids are amongst the most frequent anorectal conditions affecting approximately 4-36% of the general population. Usually, first and second degree hemorrhoids can be treated easily and effectively by conservative dietary modifications and

appropriate medications. But surgical interventions are required for grade 3 and grade 4 hemorrhoids. The present paper evaluates the treatment outcome of hemorrhoids using stapler hemorrhoidectomy.

Methods/Interventions: The study was done prospectively. Stapler hemorrhoidectomy with horizontal rectal mucopexy was performed in 135 admitted patients (114 males and 21 females) of grade 3 and 4 hemorrhoids visiting the clinic. Majority of the patients (52 patients, 38.5%) were in the age group of 31-40 years. 111 patients (82.2%) had grade 3 hemorrhoids and 24 patients (17.8%) had grade 4 hemorrhoids of which 6 patients had thrombosed and 5 patients had gangrenous hemorrhoids. The Hemorrhoid Circular Stapler (PPH-03 Ethicon, Covidien EEA auto-suture, KYGZB-33.5 Kangdi) was used in all patients. Data on pre-operative symptoms, duration of procedure, follow-up data of post-operative complications, resolution or persistency were collected. Follow-up was scheduled in outpatient clinic at 1 week, 3 week, 2 months, 3 months and 6 months post-operatively. The minimum follow-up period was 3 months and maximum 4 years. Telephonic follow-up was done in patients who were unable to visit the clinic.

Results/Outcome(s): No significant post-operative complications were observed except severe pain in 4 patients (2.9%) in the first week post-operatively. The immediate complications (all mild) included urinary retention (4.4%, n=6), difficult defecation (7.4%, n=10) and post-operative bleeding 1.5%, (n=2). 98 patients (64.4%) were discharged on the first post-operative day, and the remaining 29 patients (29.9%) were discharged by the second day. Eight patients were discharged by day 3. All patients returned to normal work/activities in an average of 3 days. There was significant improvement in overall perception of quality of life and social, physical, psychological domains after surgery. There were no recurrences during the follow-up period.

Conclusions/Discussion: Stapler hemorrhoidectomy is associated with reduced post-operative pain, earlier recovery time, and early return to work and no recurrence during the follow-up period of 6 months. The severe pain noted postoperatively (in 2.9%) in first week of surgery was in the first few cases where in the sutures for hemostasis on the staple line were taken near the dentate line. The results were satisfactory even in the grade 4 gangrenous and thrombosed hemorrhoids with a quick recovery. There was no incident of emergency admissions for postoperative rebleed. Further studies with large sample size are required to validate stapler hemorrhoidectomy as a gold standard treatment method.



a. grade 4 thrombosed hemorrhoids
 b. rectal mucosal pursestring sutures
 c. stapler firing
 d. postoperative

LASER STRICTUREPLASTY IN RECTAL STRICTURES: CASE SERIES OF 4 PATIENTS.

P18

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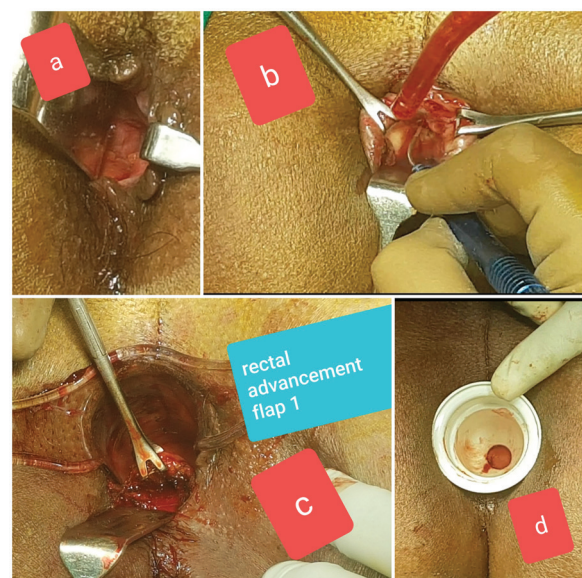
Purpose/Background: Anorectal stricture can be caused by surgery of the anal canal, trauma, inflammatory bowel disease, tuberculosis, non-steroidal anti-inflammatory suppositories, lymphogranuloma venereum, radiotherapy, and chronic laxative abuse. 90% of the anorectal strictures are caused by overzealous hemorrhoidectomy, leaving inadequate mucocutaneous bridges after removal of anorectal mucosa. Stapler hemorrhoidectomy causes predominant rectal strictures as the procedure involves rectal mucosal excision. Anorectal strictures may present with painful defecation, mechanical bolus obstruction, constipation, tenesmus, diarrhoea, urgency or when severely narrowed, large bowel obstruction. Distal rectal and anal strictures pose additional challenges in surgical treatment due to its location. The cases of low rectal stricture presented here were treated successfully with laser strictureplasty with early recovery and a good quality of life post-operatively.

Methods/Interventions: The present report is a series of 4 cases of rectal strictures in which laser strictureplasty was performed using a diode laser of 1470 nm wavelength. The fibre used to release the stricture and raise the rectal mucosal advancement flap is 1000 microm flat tip bare fibre. The follow up of patients was done upto a period of 6 months, during which the relief in the preoperative symptoms was recorded.

Results/Outcome(s): Case 1 was a patient of severe rectal stricture (post sclerosant injection, by a quack) of

approximately 1 cm. A 3 quadrant strictureplasty with release of stricture using laser upto 1 cm above and below the stricture line, was done. The respective flaps were constructed at 12 o'clock, 3 o'clock, 6 o'clock and 9 o'clock, in the submucosal plane and sutured with polyglactin 3.0 at the dentate line. The case 2 reported a post hemorrhoidectomy severe rectal stricture (with low intersphincteric fistula in ano) of approximately 1 cm. The stricture was released in all 4 quadrants (12, 3, 6, 9 o'clock) with rectal flaps of 1.5 cm raised in submucosal plane and sutures to dentate line. The fistulectomy was done after identifying the internal opening of fistula track at the dentate line at 5 o'clock. The case 3 reported a post hemorrhoidectomy rectal stricture accompanied with anal stenosis. Bilateral ano dermal flaps were mobilized at 3 o'clock and 9 o'clock. Rectal mucosal advancement flap was then raised at 8 o'clock and sutured at dentate line. The case 4 reported as 3 month post stapler hemorrhoidectomy severe (pin hole)rectal stricture with anal pain, difficult defecation and incomplete evacuation. The 4 quadrant laser strictureplasty was performed for this patient. The rectal mucosal advancement flaps were sutured at the dentate line. All the patients were discharged within 48 hours on semisolid diet followed to solid diet by postoperative 1 week, and followed up for a period of 6 months. There were no significant postoperative complications.

Conclusions/Discussion: The patients symptoms of painful defecation and incomplete evacuations were improved. Using the laser provided the benefit of a neat dissection, with a good hemostasis while raising the rectal mucosal flaps. The post-operative VAS scores were less, ranging from 0 to 2 and there was a quick recovery showing in the early return to work. We conclude that laser strictureplasty appears to be a safe and minimally invasive procedure for treatment of low rectal strictures with early recovery.



a. Rectal stricture
 b. Release of stricture with laser
 c. raising rectal mucosal flap
 d. Insertion of anal dilator after 4 quadrant strictureplasty.

COMPARISON OF BURNOUT AMONG SURGERY RESIDENTS AND ATTENDING SURGEONS.

P19

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Purpose/Background: There are concerns for the high rates of burnout in the surgical profession. There is lack of literature describing the risk factors in the surgical community in the Middle Eastern population. Our study hypothesis states that within the surgical community, surgical residents are more likely to suffer from burnout compared with attending surgeons.

Methods/Interventions: A cross sectional survey was conducted from August 2018 to October 2018 using an anonymous paper-based survey administered to physicians within the surgical department of five government hospitals in the state of Kuwait. The participants incorporated physicians at all levels of surgical training and post training. Prevalence of burnout was assessed using the validated Maslach Burnout Inventory. Burnout was defined by high emotional exhaustion, depersonalization, or low personal accomplishment. Data collected included the participants demographics, lifestyle and perceived work-related stressors.

Results/Outcome(s): Between August 2018 and October 2018 there were 67 physicians that responded to the survey. Residents comprised 65.7% of the sample. The overall burnout rate was 64.2%. We found no difference in burnout rate among surgical residents or attending surgeons. Table 1 summarizes the study findings.

Conclusions/Discussion: It appears that there are higher rates of burnout among surgery residents and attending surgeons. Further research is needed to better understand the factors contributing to surgeons' burnout.

LIVE SURGERY FOR MINIMALLY INVASIVE COLORECTAL TRAINING: A FRIEND OR A FOE.

P20

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Purpose/Background: This study evaluates perioperative and short-term postoperative outcomes in patients undergoing live minimally invasive colorectal surgery. To the best of our knowledge, this is the first study evaluating

P19 comparison of burnout factors among surgical residents and attending surgeons

	Resident N=44	Attending N=23	p-value
Mean age (SD) in years	28.6 (5.1)	45.2 (5.9)	<0.001
Mean number of children (SD)	0.3 (0.83)	2.6 (1.3)	<0.001
Mean coffee consumption per day (SD)	2.2 (1.6)	2.1 (1.7)	0.948
Mean weekly hours of exercise (SD)	2.1 (2.0)	2.1 (1.7)	0.861
Mean time spent on social media use per day in hours (SD)	2.1 (1.2)	1.7 (0.8)	0.202
Mean hours of work per day (SD)	8.2 (1.0)	8.0 (1.2)	0.735
Mean hours of sleep per day (SD)	5.5 (0.5)	5.4 (0.4)	0.191
Burnout	31 (70.5%)	12 (52.2%)	0.182
Emotional exhaustion			0.382
low	12 (27.3%)	9 (39.1%)	
average	12 (27.3%)	3 (13.0%)	
high	20 (45.5%)	11 (47.8%)	
Depersonalization			0.532
low	15 (34.1%)	8 (34.8%)	
average	12 (27.3%)	9 (39.1%)	
high	17 (38.6%)	6 (26.1%)	
Personal accomplishment			0.612
low	15 (34.1%)	11 (47.8%)	
average	20 (45.5%)	11 (47.8%)	
high	9 (20.5%)	5 (21.7%)	

the impact of live surgery on the outcomes of minimally invasive colorectal surgery.

Methods/Interventions: Outcomes of patients undergoing live colorectal operations (the study group) performed by five surgeons between 2006 and 2018 were reviewed and these patients were case-matched with those undergoing non-live operations (the control group) based on age, sex, American Society of Anesthesiologists (ASA) score, body mass index, primary diagnosis, operating surgeon, time of surgery and surgical procedure. Both cohorts were compared for intraoperative and short-term postoperative outcomes.

Results/Outcome(s): Thirty-nine live surgery cases were case-matched with its thirty-nine non-live surgery counterparts (Table). Operating time was longer (200 vs 165 min; $p=0.002$) and estimated intraoperative blood loss was higher in the study group (100 vs 55 ml; $p=0.008$). Patients undergoing live surgery stayed longer in the hospital (6 vs 5 days; $p=0.001$). While conversion ($n=4$ vs $n=1$, $p=0.358$) and intraoperative complications ($n=6$ vs $n=2$, $p=0.2$) were more frequent in the live surgery group, these outcomes did not reach statistical significance. Overall complications were higher in the live surgery group ($n=22$ vs $n=9$, $p=0.003$). One patient in the live surgery group underwent a reoperation due to postoperative bleeding. Postoperatively, one mortality occurred in the live surgery group.

Conclusions/Discussion: Live minimally invasive colorectal surgery seems to be associated with increased risk of operative morbidity.

RECTAL CANCER SURVIVAL OUTCOMES IN INFLAMMATORY BOWEL DISEASE: ARE THEY WORSE?

P21

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Purpose/Background: Rectal Cancer is the second most common malignancy in the United States. Inflammatory bowel disease (IBD) patients are at increased risk for developing rectal cancer due to chronic intestinal inflammation that results in mucosal changes leading to dysplasia and subsequent invasive carcinoma. While much literature has looked at risk factors and incidence of rectal cancer in patients with IBD, the disease free and overall survival, by stage, of IBD patients with rectal cancer remains unreported. In addition, the difference in survival in IBD versus non IBD patients remains unknown. We herein sought to determine 1) the disease free and overall survival in IBD and non IBD patients with rectal cancer and 2) the survival difference, by stage, in IBD versus non IBD patients with rectal cancer.

P20 Patient characteristics and outcomes

Primary diagnoses, n	Live surgery (n=39)	Non-live surgery (n=39)	>0.99
Rectosigmoid/Rectal cancer	17	17	
Colon cancer	11	11	
Ulcerative colitis	3	3	
Crohn's disease	2	2	
Familial adenomatous polyposis	3	3	
Tubular adenoma	1	1	
Colonic inertia	1	1	
Diverticulitis	1	1	
Operations			>0.99
Low anterior resection	18	18	
Right hemicolectomy	6	6	
Left hemicolectomy	4	4	
Subtotal colectomy	3	3	
Total proctocolectomy+J pouch+IPAA	6	6	
Ileocaecal resection	2	2	
Overall complications, n	22	9	0.003
Ileus, n	14	6	0.044
Bleeding, n	2	0	0.494
Anastomotic leakage/Abscess, n	2	1	1
Superficial SSI, n	6	3	0.481
Deep vein thrombosis, n	2	1	1
Urinary, n	1	1	1

SSI: Surgical site infection

Methods/Interventions: Using our institution's prospective cancer registry database, a retrospective review of all adult patients with rectal cancer diagnosed between 1/1/2000 and 12/31/2016 was performed. All adult patients with a previous tissue diagnosis of IBD who had a diagnosis of rectal cancer, and at least one year of post treatment follow up were included in the study cohort. Each IBD patient was matched in a 1:2 fashion based on age (+/- 5 years), sex, and rectal cancer pre-treatment stage with non IBD rectal cancer patients. Data collected included patient demographics (age, sex, ASA class, smoking status, body mass index(BMI)), preoperative rectal cancer staging, CEA levels, systemic staging with CT chest, abdomen and pelvis, the use of neoadjuvant therapy, pathologic features at the time of oncologic resection (TNM stage, grade of differentiation, presence of lymphovascular and perineural invasion, lymph node harvest and positivity, margin status), 30-day postoperative complications, the use of adjuvant therapy, and disease free and overall survival. The primary outcome was the overall and the disease free survival rate. Secondary outcomes included short term (30-day) infectious complications rate, readmission and reoperation rates. Survival analysis was performed using a cox model and survival rates were calculated with Kaplan-Meier estimates.

Results/Outcome(s): A 110 IBD study patients with rectal cancer met inclusion criteria and were matched to 220 control patients. The median age of all patients was 53 years (range, 23-88 years) and 77% were males. Patients in both groups were matched by preoperative stage where approximately 2% had Stage 0, 30% had Stage I, 19% had Stage II, 39% had Stage III and 10% had Stage IV. There were no differences in ASA, BMI, ethnicity and CEA. Non IBD patients were more likely to be smokers (13.6% vs 6.4%, $p < 0.005$), receive neoadjuvant chemotherapy (53.6% vs 35.5%, $p < 0.002$) and radiotherapy (51.6% vs 34.5%, $p < 0.0034$). There was no significant association between IBD disease status and outcomes including infectious complication ($p = 0.67$, 7.1% vs 5.9% in IBD and non-IBD respectively), surgical complications ($p = 0.36$, 10.3% vs. 7.2%), ileus (anastomosis leak) ($p = 0.13$, 0% vs 2.3%), and readmission ($p = 0.18$, 18.4% vs. 12.7%). On surgical pathology, there were no differences in TNM stage, tumor differentiation, or presence of perineural invasion or lymph node positivity ($p > 0.05$), however, IBD patients had significant increased rates of lymphovascular invasion ($p = 0.03$, 12.5% vs. 5.4%) and margin involvement ($p = 0.02$, 5.2% vs 0.9%). IBD patients with rectal cancer had an increased rate of mortality by about 35% than the patients without IBD. At two years, patients with IBD had a survival rate of 89% (95% CI 83-96%), compared with a 94% (95% CI 91%-98%) survival rate in non-IBD patients. IBD status was associated with an increased, non-significant, risk of death (HR=1.35; 95% CI 0.86-2.10, $p = 0.20$).

Conclusions/Discussion: Although our data analysis showed that IBD patients with rectal cancer had an increased mortality rate than in patients without IBD, but no significant differences were found in the overall survival and the disease-free survival rates.

APPRAISAL OF TOTALLY HANDSEWN SIDE TO SIDE ISOPERISTALTIC ANASTOMOSIS IN HIGH RISK CROHN'S DISEASE PATIENTS.

P22

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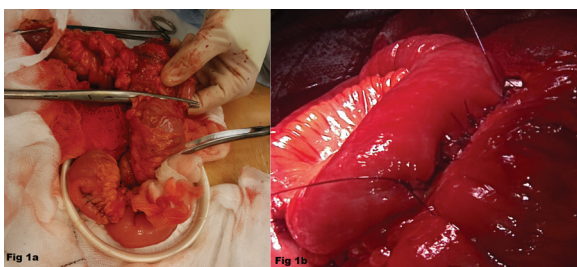
Purpose/Background: Despite many advances in the medical management of Crohn's disease, there is still a significant risk of surgical resection for failure of medical management or complications during the lifetime of a patient. 40% to 70% of patients with Crohn's disease require intestinal resection within 10 years of diagnosis, with 25% to 45% of these needing repeated intestinal resection over the following 10 years. Each intestinal resection poses a risk for anastomotic leak, a life-threatening complication that affects patient morbidity and mortality. A number of patient and disease specific factors have been associated with anastomotic failure. They include low serum albumin, preoperative steroid usage, intra-abdominal abscess or fistula at the time of surgery. Emergency surgery and history of previous small bowel resection also increase the risk of anastomotic leak, while the role of immunosuppressors is still debated. Many of these factors are nonmodifiable, such as gender, unplanned surgery, comorbidities and poor performance score. Surgical technique is an attractive target for improving anastomotic leak rates as it is operator dependent and readily adaptable to new evidence. Aim of this study was to appraise the short term outcomes of a standardised anastomotic technique in high risk anastomoses following ileocolonic resection for Crohn's disease.

Methods/Interventions: This is a prospective single surgeon experience in a tertiary Colorectal Surgery Unit during an 18 months study period from February 2017 to July 2018. Included were consecutive patients undergoing elective or emergency surgery for primary or recurrent Crohn's disease of the terminal ileum in whom the anastomosis was considered high risk. Anastomoses were defined high risk if 2 or more of the following were present: emergency surgery, intra-abdominal abscess or fistula, recurrent crohn's disease, preoperative steroid usage, anaemia and low serum albumin level. Patients underwent laparoscopic or SILS resection according to a standardised technique: the right colon, hepatic flexure and small bowel up to the third part of the duodenum were mobilised laparoscopically with extracorporeal division of the mesentery via a service periumbilical incision. A totally hand-sewn side to side isoperistaltic anastomosis was fashioned

extracorporeally. After division of the specimen at macroscopically healthy margins, the ileal and colonic stumps were closed with a running 4/0 pds suture (Fig 1a). The two bowel segments were approximated on the antimesenteric margin and following formation of an outer seromuscular layer with interrupted reabsorbable sutures (Fig 1b) two enterotomies were performed and two full thickness running sutures were started at the posterior aspect of the anastomosis and continued anteriorly with a Connell suture pattern. An anterior outer seromuscular layer was finally completed. Data were collected prospectively for each patient. 30-day morbidity and anastomotic leak rate were the primary outcomes. The secondary outcomes were operating time, reoperations and rehospitalisation within 30 days. Categorical variables are presented as frequency or percentage, while continuous variables are presented as mean (standard deviation) or median (range).

Results/Outcome(s): Twentyfive patients were included (18 primary ileocaecal resection and 7 redo resections) after excluding 2 patients who underwent resection without anastomosis. Age was 39 years (20-74), 14 patients were female (56%) and BMI was 25.1 (17-35). Eleven patients had previous abdominal surgery (44%). In 5 patients (20%) surgery was performed as an emergency. There was one conversion to open surgery (4%). Operating time was 180 minutes (80-360) and postoperative length of stay was 7.5 days (3-20). There were 5 readmissions (20%). All patients had a side to side handsewn isoperistaltic anastomosis and no clinical anastomotic leak occurred. Postoperatively 8 complications were reported: 3 ileus requiring total parenteral nutrition, 3 wound infections, 2 intra-abdominal collections (1 treated with antibiotics, 1 requiring radiological drainage). There was no mortality.

Conclusions/Discussion: High morbidity rates and septic complications are reported in the literature following ileocaecal resection in Crohn's disease patients and a recent pan European snapshot found a leak rate of 8.1% in right hemicolectomies for benign and malignant disease. Many factors are known to be associated with anastomotic leak, including patient comorbidity, underlying pathology and anastomotic technique. A handsewn anastomotic technique may provide a benefit in high risk cases together with the decision not to anastomose in selected patients. The external validity of these preliminary results needs to be evaluated in a randomized study.



GREATER LOSS OF BOWEL LENGTH, MORE ILEOSTOMIES AND COMPLICATIONS IN EMERGENCY RESECTION FOR ILEOCOLONIC CROHN'S DISEASE. A SINGLE CENTRE 8 YEARS EXPERIENCE.

P23

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Purpose/Background: Short bowel syndrome is a rare sequel of repeated surgical resection for Crohn's disease, nevertheless repeated intestinal resections leading to impaired gastrointestinal functioning with nutritional and vitamin deficiencies may have disabling consequences for the patients with bile salt diarrhoea occurring in up to half of patients with Crohn's disease following bowel resection and loss of the ileocecal valve increasing the risk of small bowel bacterial overgrowth. Surgery does not cure Crohn's disease, and should be used cautiously, although it should not be regarded as the last resort. The majority of patients are treated with elective surgery; however, bowel obstruction, perforation, peritonitis, excessive bleeding or toxic megacolon represent indication for emergency surgery. The risk of major abdominal surgery within the first 5 years of diagnosis has declined due to the advances in medical management with the use of disease modifying agents, but this has not translated into resection of shorter lengths of bowel when surgery occurs. More importantly, inappropriate delay in surgery may increase surgical morbidity and affect short and long term outcomes. The aim of this prospective study was to evaluate the length of resected small bowel in patients undergoing elective and emergency surgery for ileocolonic Crohn's disease, and to identify factors associated with a worse postoperative outcome.

Methods/Interventions: All patients undergoing surgery for ileocolonic Crohn's disease from 1st of May 2010 to 30th of April 2018 were included in this single centre observational study. Study objectives were to compare the length of resected small bowel, the stoma rate and the short-term outcomes of ileocolonic resection in: i) patients with first presentation of ileocolonic Crohn's disease undergoing elective surgery, ii) patients with ileocolonic Crohn's disease undergoing emergency surgery, iii) patients with recurrent Crohn's disease of the distal ileum undergoing elective surgery. Length of resected small bowel and stoma rate were the primary outcomes. The secondary outcomes were operating time, length of hospital stay, complications, reoperations and rehospitalisation within 30 days and were recorded prospectively. Categorical variables are presented as frequency or percentage and were compared with the use of the chi-square test or Fisher's exact test, as appropriate. Continuous variables are presented as mean (\pm standard deviation) or median (first and third quartile) and were compared with the use

of Student's *t* test. The Mann-Whitney *U* test was used for continuous, not normally distributed outcomes.

Results/Outcome(s): 168 patients were included: 87 patients in the elective primary surgery group, 50 patients in the emergency surgery group and 31 in the elective reoperative surgery group (Table 1). Patients undergoing emergency surgery were more likely to have a stoma fashioned at the time of the surgery. Eleven patients (22%) had an ileostomy in the emergency surgery group compared to 10 (11.5%) in the elective surgery group ($p < 0.0001$). Emergency surgery for ileocolonic Crohn's disease resulted in a longer length of small bowel being resected (median length of resected small bowel 30.4 cm), with additional 10 cm of small bowel being resected compared to elective surgery for primary disease (median length of resected small bowel 19 cm, $p < 0.0001$). The length of resected small bowel was longer than 40 cm in 14 patients (28%) in the emergency surgery group, compared to 7 (8%) and none in the elective surgery groups for primary and recurrent disease, respectively ($p < 0.0001$). Complication rate was 34% in the emergency surgery group, 29%, and 22.9% in elective redo surgery and elective primary surgery, respectively. According to the Dindo-Clavien classification there were 10 grade II, 6 grade III and 1 grade IV complications in the elective primary surgery group, 6 grade II, 8 grade III and 1 grade IV in the emergency surgery group, 4 grade II and 2 grade IV in the recurrent Crohn's disease surgery group. There was no mortality.

Conclusions/Discussion: Emergency surgery for primary ileocolonic Crohn's disease is associated with more extensive small bowel resection and a higher likelihood of ileostomy formation, compared to elective surgery. Timely

planning of elective surgery and high volume specialist IBD surgeons may impact on length of the resected specimen, stoma rate and postoperative outcomes when surgery is performed in specialist referral centres, which may be more often the case in recurrent Crohn's disease, with surgeons more aware of the risk of short bowel syndrome and more familiar with the use of bowel preserving techniques; these hypotheses need to be addressed in larger prospective studies. However, a low rate of emergency resection should be a goal of a well-functioning, appropriately referring, IBD unit.

ILEOCOLIC ANASTOMOSIS FOR CROHN'S DISEASE VS. COLON CANCER: DOES DIAGNOSIS INFLUENCE SHORT-TERM OUTCOMES?

P24

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Purpose/Background: Both ileocolic resection for Crohn's Disease (CD) and right hemicolectomy for colon cancer (CC) typically result in the creation of an ileocolic anastomosis (ICA). It is generally believed that Crohn's patients are in and of themselves at higher-risk for anastomotic complications. In this study, we aimed to compare the short-term outcomes of the ICA for CD and CC in a large nationwide cohort. Our null hypothesis was that a CD diagnosis was not independently associated with a higher rate of composite (any) post-operative complication relative to CC patients.

P23 Patients characteristics and postoperative outcomes of emergency, elective and redo ileocolonic Crohn's disease surgery

	Elective Primary (n=87)	Emergency (n=50)	Elective Redo (n=31)
Age (years)	32.5 (26-48)	50.5 (33.7-65.2)*	46.5 (35-59)*
Male:Female	34:53	21:29	20:11*
Body Mass Index	23.7 (20-29.1)	26 (20.5-32.5)	25 (21.7-28)
Previous surgery	16 (18.3%)	13 (26%)	31 (100%)*
Penetrating disease	15 (17.2%)	11 (22%)	2 (6.4%)*
Open surgery	2 (2.3%)	15 (30%)*	1 (3.2%)
Laparoscopic surgery	85 (97.7%)	35 (70%)*	30 (96.8%)
Conversion to open	3/85 (3.5%)	4/35 (11.4%)*	4/30 (12.9%)*
Operating time (minutes)	140 (105-180)	170 (117.5-205)*	180 (143.8 -198.8)*
Ileostomy formation	10 (11.5%)	11 (22%)*	2 (6.4%)
Length of stay (days)	6 (5-8)	8 (5-13)*	6 (4.7-10)
30 day Complications	20 (22.9%)	17 (34%)*	9 (29%)
Length of resected small bowel (cm)	19 (13-26)	30.4 (20-42)*	11 (8-17)

n: number; cm: centimetres; *:p. value <0.0001.

Categorical variables are presented as frequency or percentage. Continuous variables are presented as mean (\pm standard deviation) or median (first and third quartile).

Methods/Interventions: The ACS-NSQIP Participant User File with Colectomy Module was used to identify all patient with CD or CC (based on ICD-9 and-10 codes) who had undergone laparoscopic or open ICA (based on CPT codes) from 2012 - 2016. Patients who recently received chemotherapy and patients with an ASA score of 5 were excluded. Patients were stratified into 2 groups based on diagnosis of “CD” or “CC.” Univariate analysis assessed between group differences in demographics and peri-operative outcomes, and multivariate logistic regression models were constructed for complications, readmissions, and reoperations with CD as the primary predictor. Finally, case-matching was performed to match CD and CC were case-matched on a 1:1 basis based on age, gender, stoma, ASA class, laparoscopy, steroid use, and BMI ±3 kg/m². A total of 608 matched pairs were found. Conditional logistic regression was used to assess for independent predictors of complications.

Results/Outcome(s): Out of 8,222 patients there were 1,900 (23%) CD patients vs. 6,322 (77%) CC patients. The CD group were younger (20-45 year group, 64.8% vs. 3.9%), had a lower mean BMI (25.8 vs. 28.7), less laparoscopy (77.3% vs. 72.8%), and fewer were ASA class 3/4s (30.4% vs. 60.4%) compared with CC patients (all p<0.05). Both groups had similar stoma creation rates (40.2% vs. 39.9%, p=0.81). Preoperative chronic steroid use (66.1% vs. 1.1%), recent weight loss (5.6% vs. 3.6%), and smoking (22.5% vs. 11.9%) were more common in the CD group (p<0.05). On univariate analysis, the overall complication rate was lower in CD (20.5% vs. 25.6%, <0.001), and anastomotic leak rate was lower in CC (3.3% vs. 2.3%, p=0.01) while readmission and reoperation rates were similar. Multivariate[SL1] analysis, showed no difference in post-operative outcomes except for increased readmission risk among CD patients (OR 1.2 CI: [10.1, 1.5], p=0.03) of being readmitted in 30 days than[SL2] CC patients. Case-matched conditional analysis of outcomes (Table 1) revealed no difference in overall complications, but CD patients had a 0.38 less odds of requiring unplanned reoperations relative to CC patients.

Conclusions/Discussion: A diagnosis of CD is not an inherent risk factor for adverse outcomes after ileocolic resection, unlike disease- and age-related comorbid burden. These data suggest that pre-operative optimization of comorbidities is indicated to reduce post-operative complication rates.

Outcome	N	Odds Ratio (95% CI)	p-value
Overall Postop Complication	1,216	0.95 (0.73, 1.2)	0.73
Anastomotic Leak	1,209	0.60 (0.29, 1.2)	0.16
Any Readmission 1	1,215	1.2 (0.75, 1.8)	0.50
Unplanned Reoperation 1	1,216	0.38 (0.19, 0.76)	0.006

OR: odds ratio; CI: confidence interval.
Patients matched on gender, age, BMI±3, ASA class, laparoscopy, stoma, and steroid use

MANAGEMENT OF BLEEDING AFTER TRANSANAL ENDOSCOPIC SURGERY AND PREDICTORS OF BLEEDING.

P25

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Purpose/Background: Transanal Endoscopic Surgery (TES) is the treatment of choice for benign and carefully selected early rectal cancers. Complications are uncommon, but can include bleeding, infection and urinary retention. The purpose of this study is to describe the frequency of significant bleeding post TES, elucidate risk factors for bleeding and outline strategies to manage bleeding in this context.

Methods/Interventions: This is a retrospective cohort study of consecutive patients treated by elective TES at an academic tertiary referral center for benign and malignant lesions. Inclusion criteria were adult patients treated by TES procedure. We excluded patients where TES was converted to open or laparoscopic surgery. We defined “postoperative bleeding” as rectal bleeding that led to presentation to the hospital or emergency room visit. Descriptive statistics were used to outline the proportion of TES treated patients who developed postoperative bleeding, the interventions required and the timing of post TES bleeding. Both univariate and multivariate analysis were performed to determine potential risk factors for bleeding. Based on univariate analysis, the following variables were included in a logistic regression model: age, gender, comorbidities, ASA score, anticoagulation use, anti-platelet therapy, lesion size, lesion location, distance from anal verge, defect closure, histology and operative duration.

Results/Outcome(s): Between March 2007 and March 2017, 729 patients were included in the study. Of these patients, 37/729 (5.1%) patients experienced post TES bleeding. In 16/37 (43.2%) patients with bleeding, observation in hospital was adequate. Of the remaining, 9 (24.3%) required blood transfusion as only intervention, 5 (13.5%) required endoscopic intervention only and 5 (13.5%) required both endoscopy and blood transfusion. Two patients were managed by operative intervention. Timing of bleeding was <24hours postop in 24.3% of patients. Of the remaining, 37.8% presented within a week and 37.8% presented between 7-14 days of the procedure. In multivariate analysis, chronic kidney disease [adjusted odds ratio of 4.19 (95% CI 1.01, 17.40), p=0.048], use of aspirin [adjusted odds ratio of 2.69 (95% CI 1.19, 6.10), p=0.02] and unsutured rectal defect [adjusted odds ratio of 2.45 (95% CI 1.26, 4.75), p=0.008] were all found to be significant independent predictors of post TES bleeding.

Conclusions/Discussion: In patients treated by TES, risk factors for postoperative bleeding include chronic

kidney disease, aspirin use and unsutured management of the surgical defect. Post TES bleeding will resolve without intervention in most patients. In patients with significant blood loss or hemodynamic instability, a combination of endoscopic intervention and/or blood transfusion will usually resolve the issue. Reoperation is rarely required in these patients.

NATIONAL TRENDS OF EMERGENCY ROOM VISITS AND EMERGENCY ADMISSIONS FOR DEHYDRATION IN PATIENTS WITH ILEOSTOMIES.

P26

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Purpose/Background: Dehydration is the most commonly reported cause for hospital readmission following creation of diverting loop ileostomy. Different educational and intensive post-operative surveillance protocols have been implemented to decrease the rate of readmissions. The primary aim of this study was to assess whether there was a significant decrease in the rates of emergency room (ER) visits and subsequent emergency admissions over the last decade. The secondary aim was to identify predictors of these emergency admissions subsequent to an ER visit.

Methods/Interventions: After institutional review board exemption, a retrospective review of the Nationwide Emergency Department Sample Database (NEDS) from 2007 to 2015 was performed. Using ICD-9 and ICD-10 codes, adult patients (≥ 18 -years old) with ileostomies who visited the ER or had an emergency admission for dehydration were identified. Patients who visited the ER or had an emergency admission for other stoma-related complications as a principal diagnosis were used as a reference group. Time trend linear regression, descriptive univariate and multivariable regression were used.

Results/Outcome(s): Of 104,256 records identified for patients with an ileostomy who had an ER visit over the study period, 3,674 (3.5%) and 2,305 (2.2%) had a principal diagnosis of dehydration and other stoma-related complication, respectively. The rate of ER visits decreased by 38.8% for dehydration (from 4.9% to 3.0%, $p_{\text{trend}} < 0.001$) compared to 16.0% for other stoma-related complications (from 2.5% to 2.1%, $p_{\text{trend}} = 0.794$) [$p < 0.001$]. The rate of emergency admissions following an ER visit decreased by 36.7% (from 73.0% to 46.2%, $p_{\text{trend}} < 0.001$) vs. 10.0% (from 85.3% to 76.8%, $p_{\text{trend}} < 0.001$) for patients with dehydration and the reference group [$p < 0.001$], respectively. On univariate analysis, patients with dehydration who visited the ER and subsequently

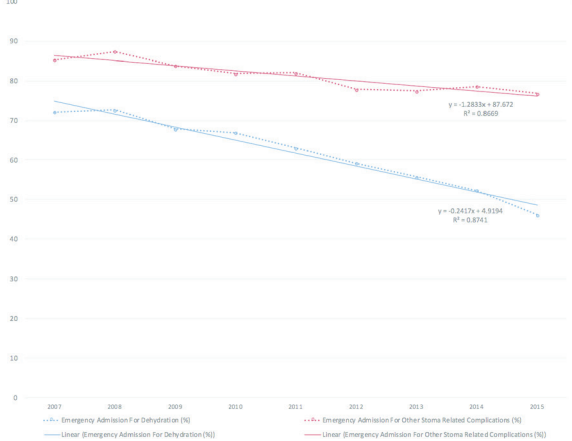
required an emergency admission were significantly more likely to be male (41.9% vs. 35.3%, $p < 0.001$), to have a higher median number of co-morbidities (5 (3, 7) vs. 3 (2, 4), $p < 0.001$) and to have a low annual household income (22.8% vs. 17.8%, $p = 0.002$) compared to those patients who were not admitted. In addition, admitted patients were more likely to present during winter (29.3% vs. 25.1% $p = 0.012$), to a teaching hospital (55.3% vs. 46.1%, $p < 0.001$), and to a hospital in the Northeast (26.3% vs. 14.9% respectively, $p < 0.001$). On multivariable analysis, younger age (OR=1.01, 95%CI 1.003 – 1.012), male sex (OR=1.37, 95%CI 1.180 – 1.420), higher number of comorbidities (OR=1.37, 95%CI 1.327 – 1.380), low annual household income (OR=1.36, 95%CI 1.085 – 1.694), teaching hospital (OR=1.40, 95%CI 1.188 – 1.646), ER visit during winter and fall (OR=1.36, 95%CI 1.108 – 1.667 and OR=1.40, 95%CI 1.137 – 1.734, respectively) and Northeast geographical regions (OR=3.004, 95%CI 2.375 – 3.799, respectively) were independent predictors of ER visits for dehydration with an ileostomy resulting in hospitalization.

Conclusions/Discussion: We observed a significant improvement in the rates of ER visits and subsequent emergency admissions for dehydration in patients with ileostomies. Independent patient-related predictors of subsequent emergency admission following an ER visit included younger age, male sex, increasing number of co-morbidities, and low annual household income. Future initiatives should target these at-risk patients in order to further decrease this preventable complication. Once patient-related risks are optimized in a systematic way, a residual rate of ER visits and admissions is to be expected due to external non-modifiable factors such as hospital type (with varying complexities of cases), geographic location and season.

Emergency Room Visits



Emergency Admissions



CAN HOSPITAL READMISSION FOR DEHYDRATION IN PATIENTS WITH A DIVERTING LOOP ILEOSTOMY BE PREDICTED? A NATIONAL READMISSION DATABASE ANALYSIS.

P27

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Purpose/Background: Dehydration is the most common stoma-related reason for readmission following the creation of a loop ileostomy. This preventable complication has been shown to be associated with serious consequences including acute kidney injury and delayed induction of adjuvant chemotherapy. The aim of this study was to develop a model that would predict readmission for dehydration for patients with a diverting loop ileostomy.

Methods/Interventions: After institution review board exemption, we used the Nationwide Readmission Database (NRD) from 2010-2015 to identify all adult (≥18 years) patients who were discharged alive after a hospitalization in which a loop ileostomy was created for a colorectal resection for the treatment for colorectal cancer, benign neoplasms, inflammatory bowel disease (IBD), and diverticulitis.

Dehydration as a primary diagnosis was defined using ICD-9/10 codes. Candidate variables considered for inclusion into the model were chosen *a priori* based on subject knowledge or statistical significance ($p < 0.15$) in a multi-variable logistic model; and included age, sex, severity of chronic illness, long-term steroid use, alcohol abuse, anemia, diabetes mellitus, congestive heart disease, chronic lung disease, depression, hypertension, liver disease, chronic renal failure, weight loss, discharge disposition at index hospitalization, index elective admission, index weekend admission, index length of hospital stay, laparoscopic/open approach, disease type, resection type (partial colectomy, proctectomy, total abdominal colectomy or ileoanal pouch reconstruction), major morbidity during the index hospitalization. In order to achieve the highest predictive accuracy, we assessed several functional forms (categorical, continuous, polynomial or interactions) for the selected predictors in a logistic regression model, which lead to five candidate models. We validated the models statistically by using a bootstrapping re-sampling technique. The final prediction model was selected using the highest area under the receiver operating curve (AUC) criterion. Model calibration was assessed using the Hosmer-Lemeshow goodness-of-fit test.

Results/Outcome(s): Of 31,266 patients who underwent a colorectal resection with a diverting loop ileostomy, 646 (2.1%) were readmitted to hospital within 30-days for a primary diagnosis of dehydration. The final prediction model included 13 variables: Age, sex, index weekend admission, index elective admission, type of disease, operation, length of index hospital stay, major morbidity during index admission, hypertension, chronic lung diseases, depression, steroid use, and discharge disposition after index admission. The model performed well in derivation (area under curve = 0.70) and validation samples (area under curve = 0.70 with 95% bootstrap CI [0.669, 0.720]) and passed the Hosmer-Lemeshow goodness-of-fit test ($p = 0.79$). Table 1 depicts the increasing risk of readmission with various different clinical scenarios.

Conclusions/Discussion: A prediction model for readmission for dehydration following loop ileostomy creation was developed and internally validated. This model can be used to identify patients at higher risk of readmission for dehydration so that the appropriate resources and educational initiatives can be directed to prevent this potentially avoidable complication. An online calculator is being created with this model to facilitate its use in clinical and research protocols.

Table 1. Risk of Readmission for Dehydration

Variable	Patient 1	Patient 2	Patient 3
Age	60	60	70
Sex	Female	Female	Female
Weekend admission	Weekday	Weekday	Weekday
Elective admission	No	Yes	Yes
Type of disease	Cancer	IBD	IBD
Type of procedure	Sigmoid colectomy	Ileoanal pouch	Ileoanal pouch
Length of stay	4 days	4 days	8 days
Major morbidity	None	None	Yes
Hypertension	None	None	Yes
Chronic lung diseases	None	None	Yes
Depression	None	None	Yes
Steroid use	None	Yes	Yes
Disposition of patient	Routine home	Routine home	Home healthcare
Risk of readmission for dehydration	1.3%	5.49%	8.4%

LAPAROSCOPIC COMPARED TO OPEN SPLENIC FLEXURE MOBILIZATION IS ASSOCIATED WITH DECREASED RISK OF SPLENIC/PANCREATIC INJURY AND PERI-OPERATIVE BLOOD TRANSFUSION WITHOUT A SIGNIFICANT INCREASE IN OPERATIVE TIME: AN ACS-NSQIP PROPENSITY SCORE-ADJUSTED ANALYSIS.

P28

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Purpose/Background: The aim of this study is to assess the impact of SFM (laparoscopic and open approaches) on the risk of splenic/pancreatic injury, peri-operative blood transfusion and prolonged operative time.

Methods/Interventions: After institutional review board approval, the American College of Surgeons' National Surgical Quality Improvement Program (ACS-NSQIP) database was queried from 2012-2016 for colectomy or proctectomy procedure codes performed for diagnoses of sigmoid cancer, rectal cancer or diverticular disease. Exclusion criteria included age <18 years, and transanal or perineal approaches. Laparoscopic and open SFM were identified in 'concurrent' or 'other' procedures using CPT codes. Propensity-score adjusted multivariable regression models were used to identify the impact of SFM, on splenic or pancreatic injury requiring operative intervention (SoPI), peri-operative (intra-operative and 72 hours post-operative) transfusion, and operative time.

Results/Outcome(s): Of 63,471 patients who underwent colon or rectal resections, 24,955 (39.3%) underwent SFM. Of those who underwent SFM, 18,625 (74.6%) were performed by laparoscopy. Sixty patients from the cohort (0.1%) developed SoPI. On propensity-weighted multivariable regression, Compared to no SFM, laparoscopic SFM showed no statistical significant association with SoPI (OR 0.83; 95%CI 0.40-1.74), while an open SFM was associated with a significantly increased risk of SoPI (OR of 3.79; 95%CI 2.0-7.0). Peri-operative transfusions occurred in 5.6% of patients. The odds for peri-operative blood transfusion were significantly greater with SoPI (OR 14.83; 95%CI 6.6-33.6) and compared to no SFM, an open SFM significantly increased the risk of per-operative blood transfusion (OR 2.23; 95%CI 2.02-2.45), while a laparoscopic SFM significantly decreased the risk of transfusion (OR 0.82; 95%CI 0.74-0.90). The median operative time for the cohort was 183 (IQR 133, 249) minutes. Compared to procedures where SFM was not performed, laparoscopic SFM increased operative time by 31 minutes (95%CI 29, 33) and open SFM by 33 minutes (95%CI 30, 35). SoPI (37.7 minutes; 95%CI: 11.36, 79.24) was a significant predictor of increased operative time.

Conclusions/Discussion: SFM is recognized to be challenging, especially when performed laparoscopically;

however it is often required to ensure a tension free anastomosis for sigmoid and rectal resections. Laparoscopic SFM was associated with significantly decreased risk of splenic/pancreatic injury and peri-operative blood transfusion, without a significant increase in operative time compared to open SFM.

HAS THE USE OF MINIMALLY INVASIVE TECHNIQUES FOR FULL THICKNESS RECTAL PROLAPSE AFFECTED LONG-TERM RECURRENCE RATES?

P29

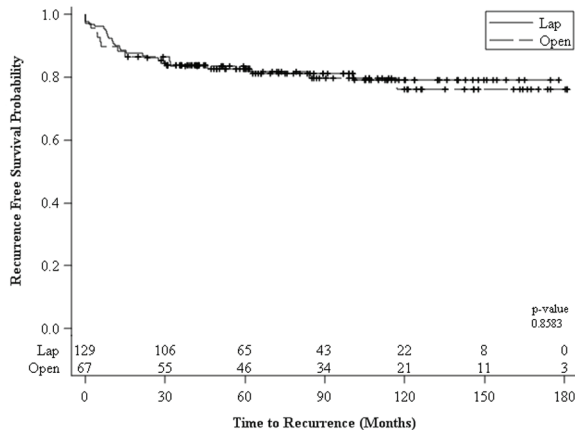
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Purpose/Background: While several case series have shown improved perioperative outcomes and comparable recurrence rates with minimally invasive surgery for rectal prolapse, according to national databases, the use of laparoscopy remains minimal. Our aim was to examine long-term trends and outcomes for rectal prolapse surgery among a multi-surgeon group within a single community practice.

Methods/Interventions: All cases of rectal prolapse surgery were identified using ICD-9, -10 diagnostic codes from an institutional, administrative database over a 14-year period. Each case was individually queried to verify indication, type of procedure and last follow-up. Only cases of first time rectal prolapse that were repaired via an abdominal approach were included. The primary outcome was defined as recurrence based on repeat surgery for recurrent rectal prolapse. Perioperative and intraoperative variables were compared among three different groups based on year of operation (2003-07, 2008-12, 2013-17). Log Rank test statistic and Kaplan-Meier curves were used to compare recurrence rates as a function of time.

Results/Outcome(s): Of the 197 patients (92% female, mean age 53) that met inclusion criteria, the overall recurrence rate was 19.3% (mean time to recurrence 22 months) at a median follow-up of 69.5 months (IQR: 37.5 to 115.0). Overall, 66% (n= 129) of abdominal cases were done via a minimal invasive approach. That percentage significantly increased during each time period from 48% to 58% to 84% ($p<0.001$). Although patients in each time period were similar in terms of BMI ($p=0.20$), they were slightly older (50.1 vs. 51.4 vs. 57.3, $p=0.02$), had a higher ASA ($p=0.001$), underwent a slightly longer operation (130.7 vs. 129.3 vs. 152.7 minutes, $p=0.04$) and had a shorter length of hospitalization (108.7 vs 69.1 vs 61.9 hours, $p<0.0001$). Not only were recurrence rates similar between open or minimally invasive surgery over time (5-year recurrence free survival – 83.4% vs. 82.6%, $p=0.86$), but they also were unchanged when comparing overall recurrence between time periods (20.0% vs. 22.4% vs. 15.8%, $p=0.58$).

Conclusions/Discussion: While the dramatic rise of minimally invasive surgery for rectal prolapse over the past decade has decreased postoperative length of stay, it has not resulted in a change in recurrence rates. Comparative studies are needed to identify whether a specific minimally invasive technique exists in order to curb persistently high recurrence rates.



THE IMPACT OF LAPAROSCOPIC TECHNIQUE ON THE RATE OF PERINEAL HERNIA AFTER ABDOMINOPERINEAL RESECTION OF THE RECTUM.

P30

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Purpose/Background: Abdominoperineal resection (APR) is necessary in select patients to manage low-lying rectal cancer, anal cancer, and inflammatory bowel disease. While the laparoscopic approach (LAPR) reduces patient morbidity over open APR (OAPR), case reports suggest a possible association of this technique with postoperative perineal hernia. However, the incidence and risk factors for perineal hernia after APR are poorly characterized. The objective of this study was to determine the impact of surgical technique on the incidence of perineal hernia after APR.

Methods/Interventions: A retrospective analysis was performed on patients treated by APR between May 2007 and March 2018 at our institution using a prospectively-maintained colorectal cancer database. Demographics, clinical parameters, and outcomes were compared between the OAPR and LAPR groups using Student's t test, chi-squared or Fisher's exact test. Putative risk factors were then analyzed using a Cox proportional hazard model with perineal hernia as the outcome. Perineal hernia was diagnosed by clinical and/or radiological criteria.

Results/Outcome(s): The study included 261 patients who received an APR for inflammatory bowel disease or cancer of the rectum or anus (191 OAPR and 70 LAPR). Follow-up was 29±23 months for OAPR patients and

20±18 months for LAPR patients ($p = 0.002$). Intra-operative blood loss (596±633 vs. 307±307mL, $p < 0.001$), duration of OR (250±116 vs. 213±75 minutes, $p = 0.004$), and length of stay (15.6±18.0 vs. 10.4±12.6 days, $p = 0.031$) were all greater for OAPR than LAPR patients, but short-term wound complications including dehiscence, infection, abscess, and perineal sinus did not differ significantly. Perineal hernia was observed in 2.1% (4/191) of OAPR and 12.9% (9/70) of LAPR patients. In multivariable analysis, significant risk factors for perineal hernia were age, laparoscopic technique, and closure of the perineal wound with myocutaneous flap (HR = 1.08, 11.13, and 31.51, respectively, all $p < 0.05$).

Conclusions/Discussion: LAPR, although associated with less blood loss and shorter length of hospital stay than OAPR, was a significant risk factor for perineal hernia. We speculate that fewer intra-abdominal adhesions form after LAPR, facilitating the movement of abdominal viscera into the pelvis. Strategies to prevent perineal hernia should be considered when a LAPR is performed.

THE USE OF HYOSCYAMINE IN FECAL INCONTINENCE.

P31

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Purpose/Background: Fecal incontinence (FI) affects approximately 18 million adults and is frequently cited as the precipitating reason to transfer to nursing homes. Patients suffer from FI for a multitude of reasons, including anal sphincter weakness, decreased perception of rectal sensation, decreased rectal compliance, overflow, low anterior resection syndrome and idiopathic causes. Hyoscyamine is an antimuscarinic that has been used in the treatment of Irritable Bowel Syndrome-Diarrhea subtype. The antispasmodic activity appears to have its greatest effect on fecal urgency. The purpose of this study was to determine if hyoscyamine can serve as an alternative medication for fecal incontinence that can be trialed as an adjunct to standard medical therapies, including fiber and antidiarrheals.

Methods/Interventions: This is a retrospective case review in a single institution involving 2 colorectal surgeons. 86 patients between January 2015 and December 2017 diagnosed with fecal incontinence were prescribed hyoscyamine 0.375mg BID for 30 days. Patients were followed for up to 18 months to determine if hyoscyamine reduced the number of patients that went on to require further testing or intervention, including sacral nerve stimulation (SNS). This was objectively determined by identifying patients that requested refills of the medication and did not proceed with other medications, therapy or surgery.

Results/Outcome(s): 86 patients with fecal incontinence were prescribed hyoscyamine between Jan 2015-Dec 2017, 20 of which were lost to follow up. Of the remaining

66 patients, 26 patients (40%) requested hyoscyamine refills for fecal incontinence and did not go on to further testing or intervention. These patients reported a decrease in urgency and fewer accidents.

Conclusions/Discussion: Hyoscyamine is a safe alternative medication for use in patients with fecal incontinence. The most commonly cited limitations to its use among our patients was cost and dry mouth. Limitations to this study include retrospective analysis and relatively short term follow up. We plan to continue following this course of treatment in a prospective database.

FECAL INCONTINENCE AFTER ACUTE STROKE (FINISH STUDY): A PROSPECTIVE LONGITUDINAL STUDY.

P32

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Purpose/Background: Stroke is the first cause of disability in general population. Permanent functional disability has been reported up to 67% of patients at 3 months. Faecal incontinence (FI) is an underestimated complication in stroke patients with a significant impact on health-related quality of life. There are limited data about its prevalence and the underlying mechanisms of its occurrence are not well understood in stroke patients with growing scientific interest in a potential sensory-motor feedback dysfunction as possible aetiology. The aim of this study was to analyse the prevalence and the natural history of faecal incontinence (FI) in patients with acute stroke at a single tertiary centre.

Methods/Interventions: Prospective and consecutive inclusion of patients with acute stroke admitted in the stroke unit that fulfill the following inclusion criteria: a first episode of stroke, aged between 18-80 years, previously functionally independent (modified Rankin Scale ≤ 2) and without previous symptoms of faecal incontinence (FI). A dedicated questionnaire (Faecal Incontinence Severity Index) was administered to each patient to detect any degree of bowel leakage at third day \pm 24 hours after stroke onset. Variables studied included: demographic characteristics of patients and details of stroke, including type, symptoms and cerebral imaging results. The National Institutes of Health Stroke Scale, (NIHSS) is a tool used by healthcare providers to objectively quantify the impairment caused by a stroke. The NIHSS is composed of 11 items, each of which scores a specific ability between 0 and 2, 3 or 4. For each item, a score of 0 typically indicates normal function in that specific ability, while a higher score is indicative of some level of impairment. The individual scores from each item are summed in order to calculate a patient's total NIHSS score. The maximum possible score is 42, with the minimum score being a 0.

Results/Outcome(s): A total of 155 patients were identified (86,5% ischemic stroke, 13,5% haemorrhagic stroke) during the study period (May to October 2018), 34,8% women, mean age, 65,38 years (DE 10,417). 60,5% were located in the left side, 34,2% in the right side, 3,9% were bilateral and 1,4 in the trunk. Of them, 12 patients (7,7%) developed FI during the admission. FI was more frequent in patients with hemorrhagic stroke compared to those with ischemic stroke (14,3% vs. 6,7%, $p=0,210$). Stroke severity was higher in patients with FI compared to those without (median NIHSS 20,83 \pm 4,08 vs 8,62 \pm 7,35, $p<0,005$, respectively) and remained as independent predictor to develop FI after adjusting by age and gender in a linear regression analyses.

Conclusions/Discussion: Nearly 8% of patients developed fecal incontinence in the acute phase of stroke, especially those with higher neurological function impairment. This may affect the hospital stay and worsen the quality of life of these patients.

FAMILIAL ADENOMATOUS POLYPOSIS PREVALENCE AND APC MUTATION SPECTRUM IN UNIVERSITY OF SOUTH ALABAMA REGIONAL PATIENT POPULATION.

P33

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Purpose/Background: Familial Adenomatous Polyposis (FAP) is a genetic condition characterized by the development of hundreds to thousands of adenomatous polyps throughout the colon and rectum, and a 100% lifetime risk of colorectal cancer without prophylactic surgery. FAP has an accepted prevalence of 1/11,300-37,600. Reported cases of FAP have shown a wide array of mutations located throughout one gene, APC. Our objectives were to determine the prevalence rate and de novo rate of FAP within the University of South Alabama patient population, compare clinical presentation of those with and without family history (FH) of FAP, and compare the observed genotype-phenotype spectrum to those reported by previous studies.

Methods/Interventions: We utilized electronic medical records to perform a retrospective analysis of genetic test results and presentations in patients with FAP. Our catchment area consisted of south Alabama, south Mississippi, and the western portion of the Florida panhandle. To establish data regarding the genotype-phenotype relationship of FAP, we analyzed the potential correlation between each mutated codon and clinical category of FAP and compared it to previously reported correlations.

Results/Outcome(s): A total of 26 patients with FAP were identified. The estimated prevalence rate in our population was 1 per 54,843 with a 16% de novo rate. Those without a family history of FAP were more likely

to be diagnosed at a later age (mean age with FH 16.58, without FH 46.25, $p < 0.05$), and they were more likely to be diagnosed with cancer (75% without FH, 4.76% with FH developed colorectal cancer, $p < 0.05$). Moderate agreement between observed and expected genotype-phenotype correlation was found.

Conclusions/Discussion: Our de novo mutation rate was consistent with previously published studies (11%-25%). However, our prevalence rate was lower, possibly due to our small sample size and/or not capturing 100% of FAP patients in our region. The significant increased incidence of colorectal cancer and later age of FAP diagnosis in those without a family history of FAP are likely due to lack of patient's knowledge of their condition and its accompanying risks, which prevents appropriate testing and screening. A number of confounding factors, not explored with this study, could explain the <100% agreement between observed and expected genotype-phenotypes correlation.

DO DIAGNOSTIC AND PROCEDURE CODES WITHIN POPULATION-BASED, ADMINISTRATIVE DATASETS ACCURATELY IDENTIFY PATIENTS WITH RECTAL CANCER?

P34

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Purpose/Background: **Background:** Procedural and diagnostic codes may inaccurately identify specific patient populations within administrative datasets. **Purpose:** Measure the accuracy of previously used coding algorithms using administrative data to identify patients with rectal cancer resections (RCR).

Methods/Interventions: **Methods:** Using a previously published coding algorithm, we re-created a RCR cohort within administrative databases, limiting the search to a single institution. The accuracy of this cohort was determined against a gold-standard reference population. A systematic review of the literature was then performed to identify studies that use similar coding methods to identify RCR cohorts and whether or not they comment on accuracy.

Results/Outcome(s): **Results:** Over the course of the study period there were 664,075 hospitalizations at our institution. Previously used coding algorithms identified 1,131 RCRs (Administrative data incidence 1.70 per 1000 hospitalizations). The gold standard reference population was 821 RCR over the same period (1.24 per 1000 hospitalizations). Administrative data methods yielded a RCR cohort of moderate accuracy (sensitivity 89.5%, specificity 99.9%) and poor positive predictive value (64.9%). Literature search identified 18 studies that utilized similar coding methods to derive a RCR cohort. Only 1/18 (5.6%) reported on the accuracy of their study cohort.

Conclusions/Discussion: **Conclusions:** The use of diagnostic and procedure codes to identify RCR within administrative datasets may be subject to misclassification bias because of low PPV. This underscores the importance of reporting on the accuracy of RCR cohorts derived within population-based datasets.

POSITIVE CIRCUMFERENTIAL RESECTION MARGINS FOLLOWING LOCALLY ADVANCED COLON CANCER SURGERY: RISK FACTORS AND SURVIVAL IMPACT.

P35

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¹Iowa City, IA; ²Houston, TX

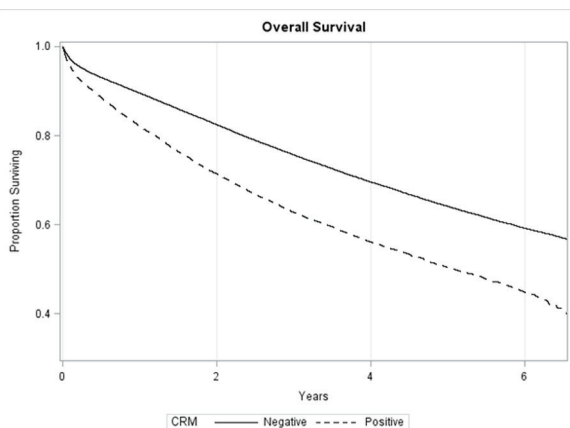
Purpose/Background: While the prognostic implications of positive circumferential resection margins (CRM) have been established for locally advanced rectal cancer, its significance in colon cancer has not been well elucidated. The National Comprehensive Cancer Network guidelines define CRM as any aspect of the colon that is not covered by a serosal layer and is created surgically by dissection of the retroperitoneum. The aim of the current study was to determine positive CRM rates after colectomy for locally advanced colon cancer, identify associated factors, and investigate its survival impact in a national cohort.

Methods/Interventions: The National Cancer Database was queried to identify patients diagnosed with stage II-III adenocarcinoma of the colon between 2004 and 2015. Analyses were limited to patients who underwent segmental colon resections. The primary outcome was a positive CRM. Risk factors for a positive CRM were identified with bivariate and multivariable analysis, while the survival impact was analyzed using Kaplan-Meier curves and Cox proportional hazards regression analysis.

Results/Outcome(s): The study cohort included 189,343 patients with a mean age at diagnosis of 68 years; 50% were males, 70% had a Charlson-Deyo score of 0, and 50% had a minimally invasive colectomy. Positive CRM was identified in 9% of stage II and 12% of stage III patients. Factors independently associated with positive CRM were T4 tumors, larger tumor size, higher number of positive lymph nodes, and presence of tumor deposits. Conversely, undergoing surgery in a high volume facility (upper quartile, >35 colectomies/year), adequate lymph node harvest (≥ 12) and negative distal/proximal margins were associated with a negative CRM. No difference in CRM rates was observed between surgical approaches (open vs laparoscopic vs robotic), although having a positive CRM was significantly associated with higher conversion rates (12.5 vs 9.0%, $p < 0.01$). Patients with positive CRM were more likely to undergo radiation and chemotherapy than those with a negative CRM (4 vs 2% and 49 vs 45%, respectively, both $p < 0.01$). Positive CRM

was significantly associated with lower overall survival on both univariate and multivariable analysis (54 vs 68% at five years, $p < 0.01$; Figure 1).

Conclusions/Discussion: Positive CRM following resection for locally advanced colon cancer has an adverse impact on overall survival. Its reported rates exceed 10% at a national level regardless of the operative approach. While several tumor characteristics were identified as independent risk factors, oncologic resections and surgery at high volume centers were associated with lower rates of positive CRM. These findings emphasize the need for process improvement initiatives targeting modifiable factors, including adoption of appropriate oncologic techniques, standardized and accurate pathology reporting, and neoadjuvant treatment strategies, to improve outcomes for locally advanced colon cancer.



DOES ADJUVANT CHEMOTHERAPY BENEFIT HIGH-RISK STAGE 2 COLON CANCER: A NOMOGRAM TO PREDICT REDUCTION IN 5-YEAR MORTALITY RISK WITH ADJUVANT CHEMOTHERAPY.

P36

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Purpose/Background: Adjuvant therapy for Stage II colon cancer is currently under debate. Current guidelines suggest adjuvant chemotherapy only for specific risk factors such as positive margins, T4 depth, or less than 12 lymph nodes. However, recent investigations have indicated that patients with additional risk factors, such as perineural invasion, may also benefit from adjuvant chemotherapy. Given the number of variables that effect long term outcomes, it is difficult to judge for an individual patient whether they would be significantly helped by adjuvant chemotherapy. This study looks at creating nomograms of five year survival for patients with stage II colon cancer after surgery, to help individual patients and their providers calculate the reduction in five year mortality

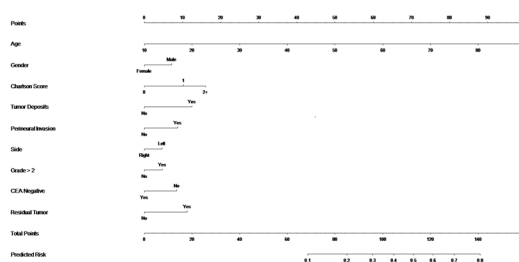
risk to be gained by undergoing chemotherapy based on a patient's specific demographics and disease characteristics.

Methods/Interventions: The National Cancer Database Colon file of 2010 was reviewed. All patients with adenocarcinoma, Stages IIa and IIb, at least five year follow up, and who underwent curative resection, were reviewed. Patients who did not have a pathologic stage, tumor margins, lymphovascular invasion (LVI), perineural invasion (PNI), or CEA result reported were excluded. Patients were divided into two groups, those who did receive adjuvant chemotherapy and those who did not. Univariate analysis was performed to initially identify variables that meaningfully impacted 5-year survival after resection without adjuvant chemotherapy, and a weighted multivariable analysis was then performed to create a nomogram. The process was then repeated for patients who underwent adjuvant chemotherapy.

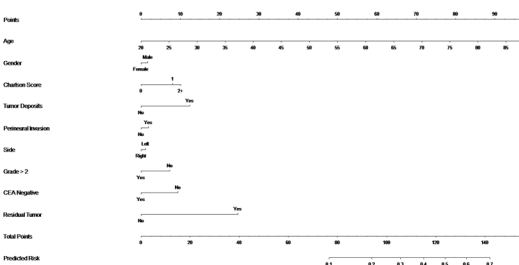
Results/Outcome(s): For patients undergoing resection without chemotherapy, the following variables were found to trend meaningfully with five-year mortality: age, gender, Charlson score, resection margins, CEA elevation, tumor deposits, residual tumor, side of tumor, and perineural invasion (Figure Nomogram 1). The C-statistic was 0.726. The model was then re-run using the same variables for patients undergoing adjuvant chemotherapy (Figure Nomogram 2). The C-statistic for this second model was 0.738.

Conclusions/Discussion: Using these nomograms, the five-year mortality can be estimated for individual patients after they undergo resection to calculate whether they have a significant risk reduction for death within 5 years by adding chemotherapy. These tools may be useful for clinicians when counseling their patients in their treatment options.

Nomogram for Probability of Death within 5 Years for Patients Undergoing Resection Only



Nomogram for Probability of Death within 5 Years for Patients Undergoing Resection and Adjuvant Chemotherapy



DOES ROBOTIC RIGHT HEMICOLECTOMY REDUCE THE RISK OF INCISIONAL HERNIA?

P37

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Purpose/Background: Robotic surgery has been popularized in the field of colon and rectal surgery. However, the benefits of robotic right hemicolectomy have been controversial. One of the theoretical advantages is to reduce incisional hernia by facilitating intracorporal anastomosis and making the extraction site smaller and locate it in more ideal place. However, there is limited data suggesting robotic surgery has lower rate of incisional hernia compared to a laparoscopic procedure. In this study, we reviewed laparoscopic and robotic right hemicolectomy performed by two surgeons in our institution and compared the rate of incisional hernia.

Methods/Interventions: A retrospective chart review of all patients who have undergone a right hemicolectomy from January 2016 to December 2017 was performed. Laparoscopic and robotic groups were compared regarding patients' demographics, operative indication, size of tumor, extraction site, length of follow up by the surgeon, and rate of incisional hernia. Incisional hernia was detected by physical exam, CT, or MRI. Patients who were converted to open procedure and who had another abdominal surgery before incisional hernia was identified were excluded from this study.

Results/Outcome(s): A total of 62 patients were included in the study. The laparoscopic group had 35 patients with mean age of 67.4 years and robotic group had 27 patients with mean age of 62.6 years. Mean BMI was higher in the robotic group (26.5 vs 32.1, $p=0.000$). Age, gender, tumor size, operative indication, and length of follow up were similar in both groups. All patient in the laparoscopic group had a vertical midline incision for specimen extraction. 11 of patients in the robotic group had vertical midline incision, and 16 patients had Pfannenstiel or left upper quadrant incision. Incisional hernia was seen in 10 patients (28.6%) in the laparoscopic group, and none in robotic group ($p=0.003$). Four patients had a fascial defect larger than 5 cm and one underwent a hernia repair.

Conclusions/Discussion: Our study demonstrated no postoperative ventral hernia in the robotic group with higher BMI. Robotic surgery may be beneficial to prevent postoperative incisional hernia. Long-term follow up and prospective study will be required to verify out outcomes.

DOES 81 MG ASPIRIN REDUCE THE RISK OF POSTOPERATIVE DEEP VEIN THROMBOSIS?

P38

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Purpose/Background: Abdominopelvic surgery for colorectal cancer has high risk for postoperative deep vein thrombosis (DVT). Mechanical and chemical prophylaxis including sequential compression device, heparin or low-molecular-weight heparin, are well established. However, the benefits of antiplatelet medications for DVT prophylaxis is uncertain. There are some controversial reports regarding using 81 mg aspirin for prophylaxis after orthopedics surgeries, yet there has not been a study of this in abdominopelvic surgery. In our study, we aimed to assess the effect of perioperative use of 81 mg aspirin in colorectal cancer patients undergoing abdominopelvic surgeries.

Methods/Interventions: All patients who underwent colorectal resection for cancer from September 2013 to September 2018 at our institution were identified using ICD and CPT codes. Medical records were reviewed regarding patients' demographics, perioperative use of antiplatelets and anticoagulants, operative indications, intraoperative blood loss, operative time, and postoperative DVT within 30 days from the surgery. Patients were divided into two groups: those were on pre-operative 81 mg aspirin and those who were not on aspirin or other anticoagulants. In our practice, we do not recommend our patients to hold 81 mg aspirin preoperatively, and resume it on postoperative day one. All patients were on prophylactic dose of subcutaneous heparin or enoxaparin during their hospital stay and it was discontinued on discharge. Patients who were on the other antiplatelet medications or higher doses of aspirin were excluded from the study.

P37 Table. Patients' demographics and outcome

	Laparoscopic (n=35)	Robotic (n=27)	p-value
Age, mean	67.4	62.6	0.091
Male	16 (45.7%)	11 (40.7%)	0.798
BMI, mean	26.5	32.1	0.000
Cancer diagnosis	24 (68.5%)	14 (51.2%)	0.200
Tumor size, mean [cm]	3.7	3.3	0.699
Follow up, mean [days]	325.3	243.7	0.158
Incisional hernia	10 (28.6%)	0 (0.0%)	0.003

Patients with DVT associated with venous injury or foreign body such as peripherally inserted central catheters were also excluded.

Results/Outcome(s): A total of 392 patients were included in the study. The aspirin group had 92 patients with mean age of 71.9 years and no aspirin group had 300 patients with mean age of 61.8 years. Mean age was higher in the aspirin group ($p=0.000$). Gender and BMI were similar in both groups. The aspirin group had a higher overall ASA score, less blood loss, and shorter operative time compared to the group not on aspirin ($p<0.034$). DVT occurred in total of 9 patients, 2 in the aspirin group and 7 in the group not on aspirin. There was no statistically significant difference in the occurrence of DVT in both groups ($p=1.000$).

Conclusions/Discussion: Our study did not show any difference in incidence of DVT when comparing patients on low dose aspirin to those not on any antiplatelet or anticoagulant medications. While there is literature suggesting a decreased incidence of DVT in various surgical procedures for patients on aspirin, further study would be important to understand if there is a benefit in colon and rectal cancer surgery patients.

TURNBULL CUTAIT IS A SAFE OPTION PRIOR TO CONSIDERING A PERMANENT STOMA.

P39

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Purpose/Background: Failed coloanal anastomoses (CAA) or difficult primary CAA can sometimes be salvaged with a Turnbull Cutait (TC) procedure to avoid a permanent stoma. TC allows adhesions to form between bowel and the anal area after mucosectomy. This allows a secured delayed primary anastomosis with precise suture placement and verification of proximal colon viability. Current literature reporting the outcomes of TC in comparison to hand sewn immediate CAA is scarce. Even though TC is a more extensive procedure, we hypothesize equivalent short-term outcomes when compared to CAA.

Methods/Interventions: In this retrospective cohort study, patients undergoing TC from 2007 to 2018 at a single institution were identified. They were compared to patients with a hand sewn CAA. Patients with side-to-end colonic or end-to-end colorectal anastomoses were excluded. Patient's demographics, diagnosis, preoperative comorbidities and 30-day postoperative complications were compared between groups.

Results/Outcome(s): 41 patients underwent TC procedure compared to 72 patients in the CAA group. The 2 groups were statistically different in terms of gender (See Table). Demographics and preoperative co-morbidities were comparable between the groups. The most common underlying pathology in the TC group was rectal fistula compared to rectal cancer in the CAA group. 67% of patients with TC had a history of previous pelvic surgery compared to 13% in CAA ($P = 0.001$). The post-operative complications were comparable between the groups. There was no statistically significant difference in the readmission rate between the groups (TC 17% vs CAA 11%) ($P = 0.37$). There were no post-operative 30 day mortalities in either group

Conclusions/Discussion: Post-operative 30 day morbidities of TC are comparable to CAA. Motivated patients with technically difficult primary CAA and complex anorectal conditions can safely undergo TC as a last resort in an effort to avoid a permanent stoma.

IN-HOSPITAL OPIOID USE AMONG PATIENTS UNDERGOING SIGMOIDECTOMY FOR DIVERTICULAR DISEASE.

P40

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Purpose/Background: Opioids are commonly used in the management of peri-and postoperative pain. The surgical experience is the first opioid exposure for many patients and 6% will develop new persistent opioid use after surgery. We aimed to evaluate the impact of robotic-assisted (RS), open (OS), and laparoscopic (LS) surgical approaches

P38 Table. Patients' demographics and outcomes

	Aspirin group (n=92)	No aspirin group (n=300)	p-value
Age, mean	71.9	61.8	0.000
Male	57 (62.0%)	159 (53.0%)	0.151
BMI, mean	29.1	28.3	0.328
ASA score ≥ 3	85 (82.4%)	206 (68.7%)	0.000
Rectal cancer diagnosis	17 (18.5%)	80 (26.7%)	0.129
Intraoperative blood loss, mean [mL]	98.0	146.6	0.007
Operative time, mean [min]	209.8	235.5	0.034
DVT	2 (2.2%)	7 (2.3%)	1.000

on perioperative opioid pain medication use among patients having sigmoidectomy for diverticular disease.

Methods/Interventions: The Premier Hospital Perspective Database was used to identify patients having sigmoid resection for diverticular disease from January 2013 to September 2015. Propensity score matching (1:1) was used to balance patient, surgeon and hospital-related characteristics when comparing opioid use between RS vs. OS, and RS vs. LS cohorts. Parenteral and/or oral opioid usage during hospitalization were converted into morphine milligram equivalents (MME). Total and average daily dose of opioids used on the day of surgery and from the day after surgery until discharge were calculated respectively. Chi-square for categorical outcomes and non-parametric Wilcoxon-Mann Whiney test for continuous outcomes were used to compare within each matched pair cohort by surgical approach.

Results/Outcome(s): Of 17,873 eligible patients, 4834 (27.0%) were OS, 11220 (62.8%) were LS and 1819 (10.2%) were RS. After propensity scores matching, 916 matched patient sets (RS vs. OS) and 1374 matched sets (RS vs. LS) were included in the final cohort. Baseline characteristics were comparable in both matched sets. Overall, more than 90% of patients received at least one parenteral or oral opioid medication dose perioperatively for each of the three surgical approaches. On the day of surgery, significantly lower parenteral opioid doses were

used in the RS group compared to LS (median: 140.0 vs. 160.0 MME, $p=0.004$), while there was no difference between RS and OS groups (median: 140.0 vs. 145.0, $p=0.185$). After the day of surgery, the RS group was more likely to receive lower doses of parenteral opioids compared to LS (median total dose: 60.0 vs. 70.0, $p=0.010$) and compared to OS (median total dose: 60.0 vs. 120.0, $p<0.001$). In addition, the duration of parenteral opioid use after the day of surgery was shorter in the RS group compared to OS (median: 1 vs. 2 days, $p<0.001$). RS patients were more likely to start oral opioids on the day of surgery than LS (12.6% vs. 10.2%, $p=0.048$) and OS (12.3% vs. 7.9%, $p=0.001$). After the day of surgery, about 75% of patients used oral opioids and there was no difference in the total dose or duration of use among groups during hospital stay.

Conclusions/Discussion: Patients undergoing sigmoid resection for diverticular disease by the RS approach use significantly lower doses of parenteral opioids after surgery than comparable LS and OS groups. Although there was no difference among groups in either percent of patients receiving opioids or dosages of oral opioids after the day of surgery, RS patients started oral opioids sooner in the perioperative period. These data may contribute to pain management strategies designed to decrease short and long-term opioid use after surgery.

P39 Table 1

	TC (N=41)	CAA (N=72)	P
Male	19	51	0.05
Age*	50.6 ± 16	57.3 ± 16	NS
BMI*	27.8 ± 5	26.9 ± 5	NS
Charlson Comorbidity Index*	3.1 ± 2	3.5 ± 2	NS
Underlying Diagnosis			
Rectal Cancer	3	47	0.05
Hirschsprung	2	4	NS
Chronic Constipation	0	2	
Anastomotic Stricture	3	2	NS
Rectovaginal or Perirectal Fistula	19	3	0.05
Rectal Prolapse	0	5	
Anastomotic Leak	9	5	NS
Other	5	4	NS
Postoperative Complications			
Pelvic Abscess or Fluid Collection Requiring Intervention	2	3	NS
Urinary Retention	3	6	NS
Ileus	3	8	NS
Acute Coronary Syndrome	0	2	
Anastomotic Dehiscence	2	1	NS
Anastomotic Leak or Fistula	3	0	
Other	7	6	NS

*values are mean ± st. dev.; NS: Not statistically significant

“TO BE OR NOT TO BE” FOR SUTURING OF THE RECTAL WALL DEFECT AFTER TEM/TAMIS?

P41

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Purpose/Background: Up to November 2018, a total of 5 original articles and 1 systematic review aiming to answer the question to suture or not to suture rectal wall defect after TEM/TAMIS were identified and the show no difference in these two choices. Our aim is to present preliminary results of our prospective study evaluating the fate of rectal wall suture during the early period after TEM.

Methods/Interventions: Since May 2017, all patients undergoing TEM for rectal neoplasms at the National Cancer Institute (Vilnius, Lithuania) were invited for a follow-up outpatient visit 7 to 10 days after TEM, clinical data were recorded and digital rectal examination was performed. A total of 50 patients are planned to be enrolled into this study before May 1st, 2019.

Results/Outcome(s): Up to date, a total of 34 patients have been enrolled in this study, 9 were women and 24 men, age range 51–85, on an average 67 years. 26 were operated for rectal adenoma or carcinoma in situ, six – for T1 rectal cancer, and two – for T2. Current published literature data does not clearly support either closure if the rectal wall after TEM/TAMIS or leaving the defect open. In our study, 7 to 10 days after TEM sutures were intact in 21 (62%) out of 34 patients, but in the rest 13 (38%) with recorded suture dehiscence, it did not have any clinical manifestation, was not related with longer postoperative stay or incidence of postoperative complications. We could not find any significant risk factors for wound dehiscence.

Conclusions/Discussion: Leaving open or closing the rectal wall defect after TEM/TAMIS – both alternatives seem to be safe and adequate, though more randomized controlled data are needed. Our study suggests that in

more than 1/3 of the patients’ rectal wall defect after TEM will undergo asymptomatic dehiscence in early postoperative period, and will not transfer to clinically significant manifestation.

OUTCOMES AND EFFECTS OF CARBOHYDRATE LOADING IN DIABETIC COLORECTAL SURGERY PATIENTS ENROLLED IN AN ENHANCED RECOVERY AFTER SURGERY (ERAS) PATHWAY.

P42

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Purpose/Background: Enhanced Recovery After Surgery (ERAS) pathways have decreased length of stay as well as patient morbidity after elective surgery. As part of these programs, pre-operative carbohydrate loading has been shown to be an effective method to improve postoperative insulin resistance. However, diabetes and post-operative hyperglycemia has been associated with increased risk of surgical site infections (SSIs). There is limited data assessing outcomes after preoperative carbohydrate loading in diabetic patients.

Methods/Interventions: A cohort of diabetic patients enrolled in an ERAS pathway from March 2015 to September was compared to non-diabetic patients during the same time period. Data regarding preoperative carbohydrate loading with Clearfast®, preoperative glucose testing, and complications were collected. Rates of complications, infectious complications, and hyperglycemia-related complications were assessed. Hyperglycemia was defined as a glucose ≥ 140 .

Results/Outcome(s): A total of 819 non-diabetic patients and 129 diabetic patients were included in this study. Mean pre-operative glucose levels were 118.2 in

P40 Parenteral Opioids Use in Propensity Score Matched Cohorts

Parenteral Opioids Use	Surgical Modality			Surgical Modality		
	OS (N=916)	RS (N=916)	P value	LS (N=1374)	RS (N=1374)	P value
On Surgical Day						
Yes, N (%)	861 (94.0%)	867 (94.7%)	0.545	1307 (95.1%)	1304 (94.9%)	0.793
Average Daily Dose (MME)	145.0	140.0	0.185	160.0	140.0	0.004
All Matched, Median (Q1, Q3)	(80.0, 250.0)	(80.0, 235.0)		(90.0, 270.0)	(80.0, 255.0)	
After Surgical Day						
Yes, N (%)	707 (77.2%)	637 (69.5%)	<.001	982 (71.5%)	958 (69.7%)	0.315
Total Dose (MME) All	120.0	60.0	<.001	70.0	60.0	0.010
Matched, Median (Q1, Q3)	(10.0, 340.0)	(0.0, 170.0)		(0.0, 240.0)	(0.0, 180.0)	
Days of Use All Matched, Median (Q1, Q3)	2.0 (1.0, 4.0)	1.0 (0.0, 3.0)	<.001	1.0 (0.0, 3.0)	1.0 (0.0, 3.0)	0.213
Average Daily Dose (MME) All	48.1	30.0	<.001	36.8	30.0	0.012
Matched, Median (Q1, Q3)	(5.0, 100.0)	(0.0, 75.0)		(0.0, 88.6)	(0.0, 77.5)	

the non-diabetic group and 202.7 in the diabetic group ($p < 0.0001$). Length of stay, readmission, and surgical site infections were not statistically different between the two groups ($p=0.095$, $p=0.52$, $p = 0.49$). However, overall complication rates were higher in the diabetic group ($p= 0.0008$).

Conclusions/Discussion: Preoperative carbohydrate loading as part of an enhanced recovery pathway results in increased preoperative hyperglycemia. Length of stay, readmission, and surgical site infections did not differ between diabetics and non-diabetics within an ERAS protocol. However, there does appear to be an increase in overall postoperative complications likely secondary to other underlying comorbidities in the diabetic population. Nevertheless, diabetic patients can derive benefits from ERAS such as decreased length of stay and do not have an associated increase in rates of surgical site infection despite higher pre-operative glucose levels.

“NUDGING A SURGEON”: CHOICE-ARCHITECTURE AND DECISION-MAKING IN SURGERY.

P43

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Purpose/Background: Choice-architecture refers to the practice of improving the quality of decisions by changing the way that choices are presented. In this narrative review, we sought to provide a high-level overview of the current use of choice-architecture in surgery. Currently, there is no published literature overtly outlining the use of choice-architecture and behavioural economics within surgery. The principles underlying behavioural economics and choice architecture are central to the design of effective quality improvement interventions.

Methods/Interventions: We reviewed the key principles of behavioural economics. We then mapped these key principles of choice-architecture design onto recent advances in surgery. The implications of these choice-architecture principles and potential future directions for surgery are outlined.

Results/Outcome(s): Thaler & Sunstein suggest key principles in the design of good choice-architecture, or “nudges”, through their mnemonic, “NUDGES” (Figure 2). We map how choice-architecture has been utilized in surgery using the NUDGES mnemonic. The salience of incentives can often be just as important as the incentives themselves. Displaying incentives prominently can help surgical teams to be more aware of their performance. Many surgical units utilize quality dashboards to display how a surgical unit is performing with regards to surgical site infections and other outcomes. Good choice-architecture should make obvious the

relevant incentives that decision-makers care about. Decisions often involve making complex trade-offs between a variety of options. In particular, these decisions can be very difficult when the choices are abstract. In rectal cancer, this is an increasingly important concept as options for local excision of T1 rectal cancers expand. A patient could be significantly influenced into pursuing local excision versus traditional radical surgery depending on how various outcomes are presented. Defaults Defaults pad “the path of least resistance”. Defaults are manifested in surgery in a variety of ways, such as the safe surgical checklist and through Enhanced Recovery After Surgery (ERAS) programs. ERAS has been shown to improve outcomes and lower length of stays in a variety of surgical settings. Crucially, ERAS and other post-operative pathways helped to reduce unnecessary, non-evidence-based inter-surgeon variability. Give Feedback Often the best way to help individuals perform better is to give good feedback. Even the mere thought of receiving feedback can help to improve individual performance. Surgical trainees are trained to use accountability to improve their decision-making, “Think about how you will justify your decision at morbidity & mortality rounds.” Surgical report-cards, the OR blackbox and video-based coaching are all efforts to improve feedback. Expect Error Human beings are not just flawed decision-makers, but predictably flawed decision-makers. When designing choice-architecture systems, it is important to accommodate predictable sources of human error. An example from surgical literature is the count at the end of the operation, which helps to mitigate “post-completion error”. Multi-disciplinary tumor (MDT) board discussions have been effective in improving rectal cancer outcomes in part because it expects errors in decision-making by single providers. Structure Complexity Many decisions are complex, and require considerations of multiple factors at the same time. Good choice-architecture can help to provide a method for dealing with this complexity. In laparoscopic cholecystectomies, a common error is mistaking the common bile duct for the cystic duct. The “critical view of safety” is a structured approach that involves identifying critical landmarks in every operation.

Conclusions/Discussion: There is enormous potential to learn from the findings of behavioural economics and apply them to surgical research. Mark Friedburg and colleagues explicitly borrowed concepts from choice-architecture literature to decrease inappropriate antibiotic prescribing. This simple “nudge” resulted in a nearly 20% reduction in inappropriate antibiotic prescriptions. Choice architecture theory will not resolve all errors in surgery. In addition, we also recognize that implementing choice architecture may result in unintended consequences. It is precisely because some interventions don’t work that there needs to be more investigation

of choice architecture interventions within surgery. Choice-architecture and the principles of behavioural economics have the potential to significantly improve the efficacy of quality improvement interventions in surgery. Surgeons should work with behavioural economists to research and implement the most effective choice-architecture systems.

Choice Architecture Principle	Description	Sunstein/Thaler Example
Incentives	The salience of incentives are just as important as the incentives themselves	Displaying the running cost of a long-distance phone bill
Understanding mappings	Make it easier for people to understand choices and "map" to their lives	Sending cellphone users a complete listing of all the ways they had used their phone and how much it cost
Defaults	Creating a path of "least resistance" to the right decision	Organ-donation
Give feedback	Create a system that tells users when they are doing well (and not)	Wet "pink" paint that turns white when dry
Expecting error	Designing a system that is forgiving of predictable errors	Subway machine that accepts ticket no matter how it was inserted
Structure complex choices	Simplify complex choices or offer a way to deconstruct them	Netflix's presentation of movies by genre/actor

A PATIENT-CENTERED REMOTE CARE PATHWAY TO MANAGE POSTOPERATIVE COMPLICATIONS IN OSTOMATES.

P44

R. Fearn

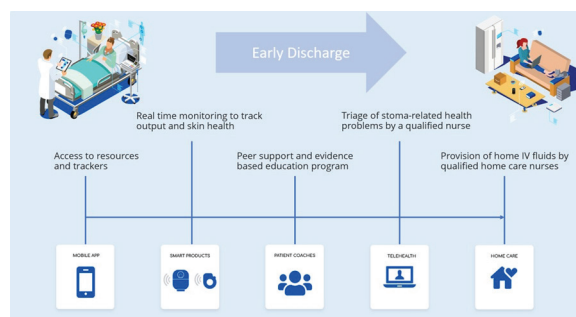
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Purpose/Background: Patients that undergo surgery resulting in a stoma (ileostomy or colostomy) suffer a significant burden of morbidity in terms of increased length of stay, increased hospital readmissions for dehydration and acute kidney injury, skin complications and impaired quality of life (1). There is a wide variation in both the patient education and perioperative support offered. We aimed to design a patient-centered care pathway, incorporating remote patient monitoring and telehealth technologies and focused on the outcomes that matter most to patients.

Methods/Interventions: An extensive literature search identified perioperative interventions most likely to improve outcomes in stoma patients. An advisory group was convened consisting of current and previous stoma patients (n=25) and senior clinicians experienced in managing stoma patients (n=13). Further surveys were conducted at the American Society of Colorectal Surgeons annual conference (Nashville, 2018 n=78) and the World Ostomy and Continence Nurse Society meeting (Reading, 2018 n=51). A structured qualitative process identified the most important features to each group. A clinical pathway was proposed, and a team of engineers and developers assessed the technical feasibility before starting development. Individual aspects of the pathway were prototyped and rapidly iterated in consultation with the advisory group.

Results/Outcome(s): A literature review identified that educational interventions and peer support programs are effective in empowering stoma patients to self-manage and improved monitoring of patient hydration status can reduce complications including readmissions and improve quality of life. (2) (3) (4). These interventions are also highly acceptable to patients. Issues most frequently raised by patient members of the advisory board as intrusive to their quality of life were skin irritation (83%), detecting and minimizing leakage (40%), frequency of bag changes (17%), and the ability to differentiate fluid output from gas (19%). Clinicians were overwhelmingly concerned about the cumulative volume of stoma output (100%). 59% reported they had recommended admission purely to monitor stoma output. and indicated that the ability to remotely monitor this would shorten length of stay and prevent readmission (99%).

Conclusions/Discussion: A novel model of care was developed using remote monitoring, peer support, telehealth nursing and home healthcare components. Remote monitoring is provided through a 'smart' stoma bag and base-plate system which utilizes capacitive and thermal data to map stoma output and saturation of the base-plate in real time. Patient-level alerts inform a patient of a full bag or of an impending leak. All patients are paired with a peer who is a current or previous stoma patient, trained as a health coach to provide education and support. Ongoing health concerns including dehydration or skin issues can be escalated to a telehealth nurse who has access to telemetry from the platform. If features of dehydration are present, IV rehydration can be arranged in the patient's own home. The impact of this pathway on readmissions and other complications is currently being assessed.



A patient-centered remote care pathway to manage postoperative complications in ostomates incorporating remote monitoring, peer-support coaching, telehealth nursing and homecare.

SERIAL ASSESSMENT OF BOWEL FUNCTION AND QUALITY OF LIFE FOLLOWING TRANSANAL ENDOSCOPIC MICROSURGERY FOR RECTAL TUMORS.

P45

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Purpose/Background: Transanal endoscopic microsurgery (TEM) has emerged as the technique of choice to locally excise premalignant and some early malignant rectal lesions. TEM can be used to treat properly selected rectal lesions with lower operative morbidity and mortality compared to more radical resections, and may allow some patients to avoid a temporary or permanent ostomy. Despite these advantages, there is only limited study on long term functional outcomes after TEM. TEM involves a 40-mm diameter operating proctoscope, which dilates the anal sphincter, sometimes for several hours. TEM can also cause anatomical rectal wall distortion, especially from scarring and contraction at large excision sites. No previous studies have examined the functional outcomes of TEM compared to more radical resections over time using validated measures of bowel function. The primary objectives of this study were to assess bowel function in patients undergoing TEM compared to patients undergoing low anterior resection (LAR) for rectal tumors or those undergoing only a colonoscopy. We also compared quality of life scores in the 3 cohorts as measured based on validated questionnaires.

Methods/Interventions: Patients undergoing: (1) TEM or (2) LAR for rectal tumors, or 3) colonoscopy with endoscopic polypectomy participated in this study. The colonoscopy cohort was included as a control group. Participants prospectively completed bowel function and quality of life questionnaires prior to surgery and again post-operatively at 3 and 6 months, and at 1 year. Bowel function measures included: (1) the Memorial Sloan-Kettering Bowel Cancer Center Function Questionnaire (MSKCC BFQ) and (2) the Low Anterior Resection Syndrome (LARS) score. Quality of life measures included the European Organization for Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire (QLQ) Core (C)-30 or the Colorectal (CR)-29 instruments. All of the included questionnaires have been previously validated. Previous studies using the MSKCC BFQ found measurable differences between local excision and LAR cohorts, with an effect size of $d = 0.7$. To achieve the same effect size, with a 2-tailed alpha of 0.05 and a power of 0.8, we estimated that 33 participants were required in each group. We used separate repeated measures analyses of variance (ANOVAs) (for each of the measurement instruments) with treatment group as the between-subjects factor (3 groups: TEM, LAR, and colonoscopy groups) and time period as the within-subject factor (4 time periods:

baseline, 3- and 6-months and 1-year). For each ANOVA, we analyzed all effects significant at $P < 0.05$ using Tukey's HSD post hoc tests.

Results/Outcome(s): 113 patients participated, including 36 in TEM, 35 in LAR, and 42 in colonoscopy treatments. 60.2% of subjects were male, and 39.8% female. Mean age was 64.2 years, with range of 27-86 years of age. 28 of 35 LAR subject had a temporary loop ileostomy, with their 3, 6, and 12-month time points starting after the date of reversal. 69 patients declined to participate in the study. On separate one-way repeated measures ANOVAs, Wilks' Lambda statistics were calculated and found to be significant for both LARS Score and MSKCC BFQ. The Partial eta squared for these same tests suggests a very large effect. LARS scores were significantly different between LAR and colonoscopy groups with $p < 0.05$ on Tukey's HSD post hoc tests. There were no significant differences found between LAR and TEM or between TEM and colonoscopy on this scoring system. Significant differences were also found between LAR and TEM, and LAR and colonoscopy groups on MSKCC BFQ testing with $p < 0.05$ on Tukey's HSD post hoc tests. Figure 1 shows the MSKCC BFQ scores by group over time. No significant differences were found between any of the groups on either EORTC scoring systems.

Conclusions/Discussion: While LAR is associated with measurably worse bowel function, there were no measurable differences in bowel function between TEM and colonoscopy. This was more robustly demonstrated with the MSKCC BFQ scoring system. No significant differences in quality of life were demonstrated between treatment modalities, which suggests quality of life depends on factors other than bowel function. Our findings support the use of TEM as a safe modality of treatment for rectal lesions, associated with good functional outcomes. These findings can be applied to help select patients for TEM, and inform the consent process for patients undergoing major rectal procedures.

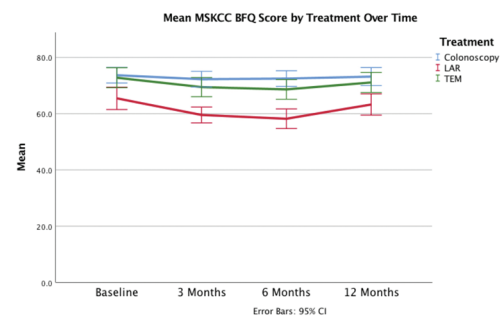


Figure 1: Comparison of Mean MSKCC BFQ Scores for Colonoscopy, LAR, and TEM treatments at baseline, 3 and 6 months, and at 1 year.

COMPARISON BETWEEN PROPHYLACTIC AND SELECTIVE LATERAL PELVIC LYMPHADENECTOMY FOR LOWER RECTAL CANCER: RETROSPECTIVE SINGLE INSTITUTION STUDY OF 355 PATIENTS.

P46

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Purpose/Background: Lateral pelvic lymphadenectomy (LPL) for rectal cancer is still controversial in Western countries. We performed prophylactic LPL for most of healthy advanced rectal cancer patients until middle of 2011, and we shifted to selective LPL for only the patients with suspicious lateral lymph node metastasis. Purpose of this study is to compare the results between prophylactic (Group-P) and selective (Group-S) LPL.

Methods/Interventions: Group-P included 150 R0 patients since 2007 to May, 2011 and Group-S included 205 R0 patients since June, 2011 to February, 2015. Mean follow-up period was 67 months in Group-P and 53 months in Group-S.

Results/Outcome(s): Group-P and Group-S were similar characteristics of age (64.4 vs 63.3), gender (male 68% vs 69%), pathological stage (I: 35% vs 30%, II: 20% vs 26%, III: 45% vs 43%), and procedures (LAR: 46% vs 56%, ISR: 31% vs 29%, APR: 17% vs 14%), respectively. LPL was performed more in Group-P (37% vs 17%, $p < 0.001$). Group-P was longer operative time (301min. vs 279 min.) and larger blood loss (281g vs 97g). While Group-S was more laparoscopic rate (90% vs 46%, $P < 0.001$) and shorter postoperative hospital stay (mean 14.0 days vs 14.4). Lateral lymph node metastasis was observed 10% in Group-P and 8% in Group-S ($P = 0.47$). Effective LPL (positive metastasis case / LPL case) was 27% in Group-P and 46% in Group-S. Local recurrence rate was 8.0% in Group-P and 12.7% in Group-S ($p = 0.16$). Resection rate of local recurrence was 33% (4/12) in Group-P and 54% (14/26). No recurrence after local recurrence resection was 25% (1/4) in Group-P and 79% (11/14) in Group-S ($p = 0.045$). Solitary lateral lymph node recurrence was observed 2 patients in Group-P and 8 patients in Group-S. Cured patients were observed only in Group-S, 6 of 8 patients.

Conclusions/Discussion: Selective LPA was possible to perform similar positive lateral lymph node removal to prophylactic LPA. Also curable local recurrence resection was frequently observed, especially lateral lymph node recurrence.

OPTIMAL TREATMENT STRATEGY FOR RECTAL CANCER BASED ON THE RISK FACTORS FOR RECURRENCE PATTERNS.

P47

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Purpose/Background: For advanced low rectal cancer, additional treatments other than total mesorectal excision (TME), such as neoadjuvant chemoradiotherapy (nCRT), neoadjuvant chemotherapy (NAC), and lateral pelvic lymph node dissection (LPLND) are important to prevent the postoperative cancer recurrence. However, they should be applied only for selected patients with high risk of recurrence, because they are associated with several adverse events, including anal dysfunction, urogenital dysfunction, sexual dysfunction, and secondary cancer. Recurrence patterns following rectal surgery are categorized into local recurrence and distant metastasis. In addition, local recurrence could be sub-categorized into pelvic cavity recurrence and LPLN recurrence, because the underlying mechanism for each recurrence pattern were completely different; LPLN recurrence is developed through lymphatic flow to the LPLN region, whereas pelvic cavity recurrence is considered for residual cancer cells to grow at a local pelvic site. The aims of this study were to investigate the risk factors associated with each recurrence pattern and to identify the optimal treatment strategy based on these risk factors.

Methods/Interventions: We enrolled consecutive 240 rectal cancer patients with cStage II/III who underwent curative resection in our hospital between 2005 and 2017. Patients with distant metastasis or who underwent non-curative resection were excluded. All of the surgical procedures included lymphadenectomy using a standard TME technique. On the pre-treatment MRI and CT, we generally diagnosed LPLN ≥ 5.0 mm in short-axis diameter as suspected metastasis. Clinically suspected involvement of circumferential resection margin (cCRM) was defined as "positive" when the invasion front of the tumor was within 1 mm from the mesorectal fascia on the pre-treatment MRI and CT. LPLND was selectively performed for patients with LPLNs clinically suspected of having metastasis. Prophylactic dissection of non-swollen LPLNs (i.e., clinically negative) was not performed. To determine the risk factors for LPLN recurrence, we defined "potential LPLN recurrence" as both LPLN recurrence and the pathologically-positive LPLN metastasis in patients treated with LPLND.

Results/Outcome(s): Among 240 study patients, 164 were males and 76 were females with a median age of 66 years old (21-90). Median follow-up duration was 57 months. The patients were staged as follows: cStage II, $n = 73$ (30%) and III, $n = 167$ (70%). cCRM was positive in 66 patients (27%). nCRT was performed for 25 patients (10%), NAC was for 46 patients (19%), and LPLND was for 35 patients (15%), nine of whom were pathologically positive. Five-year overall survival and relapse-free

survival were 87% and 70%, respectively. As the recurrence patterns, pelvic cavity recurrence occurred in 15 patients (6%), LPLN recurrence in 8 patients (3%), and distant metastasis in 42 patients (18%). Multivariate analysis to identify the risk factors indicated that pelvic cavity recurrence was associated with cCRM status and tumor histology (log rank $P = 0.003$ and 0.035 , respectively), that potential LPLN recurrence was associated with serum carcinoembryonic antigen level and LPLN swelling ($P = 0.023$ and < 0.001 , respectively), and that distant metastasis was associated with clinical N category (log rank $P = 0.018$). Based on the status of cCRM, 240 patients were stratified into two subgroups: cCRM-positive ($n = 66$) and cCRM-negative ($n = 174$). In the cCRM-positive subgroup, cumulative rate of pelvic cavity recurrence was lower in the nCRT group than in the NAC group or non-NAC/nCRT group ($P = 0.022$ and 0.089 , respectively). Meanwhile, no significant difference was observed among the three groups in LPLN recurrence and distant metastasis. In the cCRM-negative subgroup, there was no significant difference among the three groups in each recurrence pattern.

Conclusions/Discussion: The risk factors of three recurrence patterns; pelvic cavity recurrence, LPLN recurrence, and distant metastasis, were all different. nCRT is recommended for the cCRM-positive patients, while LPLND is recommended for the patients with LPLN swelling.

Variables n=240	Pelvic cavity recurrence				Potential LPLN recurrence				Distant metastasis				
	n	5-yr recurrence rate	P value	HR	P value	n	P value	OR	P value	n	P value	HR	P value
Age													
≥ 70	83	3.5			3					26.2			
< 69	157	10.3	0.154		11	0.626				19.6	0.314		
Sex													
Male	164	9.8			8					19.0			
Female	76	5.3	0.419		6	0.354				27.9	0.158		
Location													
Ra	117	6.6			3					16.7			
Rb-P	123	8.3	0.835		11	0.008*	0.066			26.8	0.164		
CEA*													
< 5	103	6.4			4					19.9			
≥ 5	137	11.2	0.073	0.219	10	0.006*	4.79	0.018*		24.3	0.250		
cCRM*													
negative	174	3.9			6					20.2			
positive	66	20.5	<0.001*	4.92	0.003*	8	0.011*	0.346		26.8	0.527		
cT													
cT1/2	21	0.0			0					37.2			
category													
cT3/4a/4b	219	8.4	0.237		14	0.233				18.6	0.072	0.121	
cN													
cN-	81	3.5			2					12.4			
(cStage II)													
cN+	159	10.7	0.112		11	0.051				25.8	0.023*	2.44	0.018*
(cStage III)													
LPLN* swelling													
Negative	205	7.8			5					22.5			
Positive	35	11.6	0.556		9	<0.001*	8.45	0.002*		17.1	0.596		
Histology													
well / moderate	224	6.9			11					20.9			
por / muc	15	30.9	0.002*	4.13	0.035*	3	0.016*	0.971		38.8	0.229		

COMPARISON OF PATHOLOGY AND SPECIMEN QUALITY OF TRANSANAL TOTAL MESORECTAL EXCISION (TATME) WITH MINIMALLY INVASIVE TOTAL MESORECTAL EXCISION (TME) FOR RECTAL CANCER.

P48

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Purpose/Background: Total mesorectal excision (TME) is known to improve oncologic outcomes in rectal cancer, and TME quality is one of the main prognostic factors associated with local recurrence in rectal cancer. Transanal

TME (taTME) is an approach that may have the benefit of allowing for better definition of the distal margin and better visualization of hard-to-access anatomical areas. In this study, we compared the pathology and quality of the TME specimens between taTME and minimally invasive TME (including laparoscopic, robotic, and hand-assisted approaches).

Methods/Interventions: Patients who underwent taTME or minimally invasive TME (laparoscopic, robotic and hand-assisted approaches) in a 5-year period January 2013 and December 2017 were included. Cases that required conversion to open or where the rectal dissection was completed in an open fashion were excluded. Patient characteristics, staging, treatment, operative variables, and pathology data were collected in a REDCap database. A p value < 0.05 was considered statistically significant. We presented data on continuous outcomes as the mean with standard deviation (SD) or median with range (min-max), where necessary. Statistical comparisons for continuous variables were made using the Student t-test/ANOVA test for normally distributed variables or the Mann Whitney U Test/Kruskal Wallis test for non-parametric alternatives. For categorical data, Fisher exact test or Chi-Square tests were used. Univariate analysis was performed using logistic regression analysis.

Results/Outcome(s): There were 67 taTME patients and 84 minimally invasive (48 laparoscopic, 20 robotic, 16 hand-assisted) TME patients during this time period. There were no differences in the baseline patient characteristics or comorbidities between the groups including diabetes, smoking and steroid use, or pre-operative staging. There was a significant difference in the percentage of patients who had received neoadjuvant chemoradiation in the taTME versus minimally invasive group (88.1% vs 42.9%; $p < 0.001$). The taTME group had significantly more hand-sewn vs. stapled anastomosis (64.6% vs. 20.2%; $p < 0.001$) and more end-to-end anastomosis (67.7% vs 47.6%) vs. side-to-end (4.6% vs 1.2%) or colonic J-pouch (27.7% vs 51.2%) compared to the minimally invasive group. Tumors in the taTME group were closer to the anal verge (6.2 +/- 2.6 cm vs 8.3 +/- 3.8 cm; $p = < 0.001$) and there was a higher percentage of clear circumferential resection margins with the taTME approach (96.9% vs 86.8%; $p = 0.03$). There was no difference in the mesorectal quality, lymphovascular or perineural invasion, or number of lymph nodes harvested or positive between the two groups. Further analysis using logistic regression showed that neither distance from the anal verge nor neoadjuvant chemoradiation therapy was a predictor of tumor-free circumferential resection margins.

Conclusions/Discussion: Based on our single institution analysis of taTME as compared to minimally invasive TME pathology and specimen quality, the taTME approach had a significantly higher percentage of tumor-free circumferential resection margins in a patient population with significantly lower tumors who had more

frequently received neoadjuvant chemoradiotherapy. Our data suggest that there may be a beneficial role for the taTME approach for improved tumor-free circumferential resection margins.

OH MY ACHING HEMORRHOIDS: SURGEONS' PERCEPTIONS AND OPIOID PRESCRIBING PATTERNS FOLLOWING ANORECTAL SURGERY.

P49

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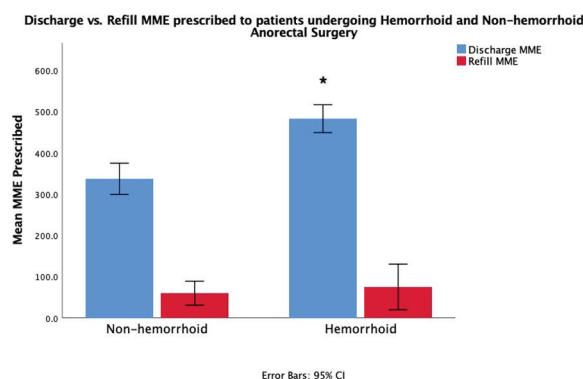
Purpose/Background: Opioid abuse has come to the forefront of national public health as the opioid epidemic continues to pose grave consequences. Surgeons are a primary prescriber of opioids and contribute to the availability of opioids for potential abuse. The appropriate quantity of opioids to prescribe after outpatient anorectal surgery is unclear. It is suspected that hemorrhoid surgeries bear a higher pain burden compared to non-hemorrhoid anorectal operations, however, it is unknown if this translates to greater amounts of opioids prescribed either at discharge or as refills. In this study, we sought to characterize the opioid prescribing habits of surgeons for both hemorrhoid and non-hemorrhoid anorectal surgery, hypothesizing that surgeons would prescribe more opioids to hemorrhoidectomy patients at discharge due to greater anticipated pain.

Methods/Interventions: We identified all patients undergoing anorectal operations at a tertiary-care medical center from July 1, 2016 to June 30, 2017. Demographic information and postoperative opioid prescriptions were identified by chart review. Univariate analysis compared patients undergoing intervention for hemorrhoids to those undergoing a non-hemorrhoid anorectal operation, with the primary outcome of morphine milligram equivalents (MME) prescribed in the 90 days following the anorectal operation. A secondary analysis compared MME prescribed at discharge to MME prescribed as refills. Finally, multivariable linear regression analyses identified clinical factors impacting postoperative opioid prescriptions.

Results/Outcome(s): A total of 180 patients were included, including 93 (51.7%) undergoing intervention for hemorrhoids and 87 (48.3%) with a non-hemorrhoid anorectal operation. Hemorrhoid patients were older compared to non-hemorrhoid patients (51.4 years vs 41.9 years, $p < 0.001$), but had similar rates of long-term opioid use (6.5% vs. 10.3, $p = 0.345$), local anesthetic administration (79.6% vs. 79.3%, $p = 0.966$), and ketorolac administration (34.4% vs. 34.5%, $p = 0.992$). Patients undergoing hemorrhoid procedures received a mean of 558 MME (SD 329.3) while patients undergoing non-hemorrhoid procedures received 397 MME (SD 229.5) [$p < 0.001$]. The hemorrhoid group received 483 MME (SD 163.5)

at discharge compared to 337 MME (SD 178.3) for the non-hemorrhoid group [$p < 0.001$]. However, the amount prescribed as refills was similar between groups, with 74.9 MME (SD 268.5) for the hemorrhoid group and 59.9 MME (SD 136.7) for the non-hemorrhoid group [$p = 0.64$]. In the multivariable linear analysis, hemorrhoid surgery was a predictor of greater MME prescribed ($p < 0.001$). Furthermore, being a long-term opioid user was a predictor of greater MME prescribed ($p < 0.001$).

Conclusions/Discussion: The results of this study suggest that surgeons at our institution prescribe greater quantities of opioids upon discharge to patients undergoing hemorrhoid operations compared to non-hemorrhoid anorectal operations. Despite this difference, patients undergoing hemorrhoid surgery had similar refill requirements compared to non-hemorrhoid surgical patients. Thus, surgeons appear to demonstrate a preference for prescribing opioids proactively rather than reactively when anticipating greater post-operative pain. Prospective studies identifying how many opioids patients are actually taking after their operations and how adjunctive non-opioid analgesics impact these numbers are needed to clarify how prescribers should handle anticipated pain levels after anorectal surgery to minimize excess opioid prescriptions.



Comparison of the quantities of MME prescribed at discharge and as refills to patients undergoing hemorrhoid and non-hemorrhoid anorectal surgery. * Significant differences between the hemorrhoid and non-hemorrhoid groups were determined by p -value (≤ 0.05).

POST-DISCHARGE OPIOID CONSUMPTION AFTER COLECTOMY: DOES OPERATIVE APPROACH MATTER?

P50

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Purpose/Background: Opioids are overprescribed after surgery, leaving patients with excess pills that represent a source for opioid dependence, misuse, and diversion into the community. As a result, surgeons are under increasing pressure to reduce postoperative opioid

prescribing. Minimally invasive approaches to colorectal surgery are partly justified by a reduction in the use of narcotics. However, studies comparing minimally invasive and open colectomy report opioid use only in the immediate postoperative period (e.g., during the inpatient stay). Little evidence exists describing opioid prescribing and consumption following discharge. Therefore, we sought to determine if opioid consumption after discharge is less in patients undergoing minimally invasive colectomy compared to patients undergoing an open approach.

Methods/Interventions: This population-based study included adults ≥ 18 years undergoing colectomy across 33 health systems in Michigan. On postoperative day 30, patients were contacted by phone or email and asked to report their post-discharge opioid consumption. Patient-reported opioid consumption in oral morphine equivalents (OME) was compared across operative approaches using linear regression analysis to calculate risk-adjusted opioid consumption with robust standard errors. Further, we used logistic regression to test the likelihood that a patient would consume no opioid after surgery at all. The primary exposure variable was undergoing minimally invasive colectomy. Additional covariates included patient age, race, tobacco use, obesity, cancer status, occurrence of complication, and the quantity of opioid prescribed.

Results/Outcome(s): We identified 566 patients, mean age 63 years, 52% female. Of these, 285 (50.3%) underwent minimally invasive colectomy. Amounts of prescribed and consumed opioid are presented in pills of 5/325 mg hydrocodone/acetaminophen for ease of interpretation. Overall, patients were prescribed significantly higher amounts than they consumed: median 30 pills (IQR: 21-45) prescribed compared to 9 pills (IQR: 0-28) consumed ($p < 0.001$). Patients undergoing minimally invasive colectomy were prescribed 6.8 pills fewer than patients after an open approach ($p = 0.023$). Logistic regression demonstrated that patients who underwent minimally invasive colectomy consumed 3.5 fewer pills than patients after an open approach ($p = 0.026$). Of patients undergoing minimally invasive colectomy, 33% were predicted to consume no opioid at all, compared to 24% of patients after an open approach (OR 1.62, $p = 0.015$).

Conclusions/Discussion: After minimally invasive colectomy, decreased opioid use persists beyond the immediate postoperative period, with patients consuming significantly less opioid after discharge compared to patients undergoing an open approach. In addition, a larger proportion of patients do not require opioids after minimally invasive colectomy compared to open. Our study supports an overall reduction in opioid prescribing for both minimally invasive and open colectomy. Further work to identify patients who may not require opioids after surgery may contribute toward the greatest reduction in opioid prescribing.

THE ROLE OF GLYCEMIC ENDOTHELIAL DRINK IN REDUCING ACUTE KIDNEY INJURY AS PART OF THE ERAS PROTOCOL.

P51

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Purpose/Background: Patients undergoing colectomy are at increased risk of developing acute kidney injury (AKI). With the standardization of perioperative care through the enhanced recovery after surgery (ERAS) protocol, there has been recent interest in determining both the protective and harmful renal effects of various elements of the protocol. The use of preoperative hydration with electrolyte solutions has been implemented as a way to balance the potentially detrimental effects of perioperative fluid restriction and use of vasopressors. Glycemic Endothelial Drink (G.E.D) is a citrulline and electrolyte-containing complex carbohydrate solution that supports hydration and insulin sensitivity in the perioperative period. The purpose of this study was to evaluate 30-day AKI rates and postoperative outcomes among colorectal patients who received G.E.D. as part of the ERAS protocol prior to undergoing colorectal surgery.

Methods/Interventions: This was a single center, retrospective study (May 2017-October 2018) of consecutive patients who underwent elective colon resection with the ERAS protocol. All patients received preoperative education, pain management, and an antibiotic and mechanical bowel preparation prior to surgery. Each patient also received three G.E.D. powder packets to be consumed with the bowel preparation. The primary study outcome was 30-day rate of AKI. AKI was defined as a rise in serum creatinine ≥ 1.5 times baseline within 30 days of surgery. Secondary outcomes included the incidence of 30-day rate of readmission and surgical site infection. Additional variables measured were surgical technique (open vs. laparoscopic vs. robotic), intraoperative fluid administration, estimated blood loss, and postoperative urine output.

Results/Outcome(s): A total of 87 colorectal patients, 53 male (61%), underwent colon or rectal resection and were included in this study. The 30-day AKI rate was 2% (2 patients) among those who received G.E.D. when compared to the current literature that reports rates of 11-13%. Nine patients (10%) were readmitted within 30 days of discharge, and five patients (6%) developed surgical site infections. Surgical technique consisted of 70 robotic (80%), 12 open (14%), and 5 hand-assisted laparoscopic (6%) cases. Intraoperative fluid administration was on average 901 ml \pm 344 (range 200 to 2700 ml) per case. Both patients who developed post-operative AKI received greater than 1200 ml of fluid. EBL was an average of 98 ml \pm 97 (range 5 to 600 ml). One patient who developed AKI had a greater than average 600 ml estimated blood loss. Two patients (2%) were oliguric after surgery.

Conclusions/Discussion: G.E.D administration as part of the preoperative ERAS protocol may have a protective effect on development of AKI in patients undergoing elective colorectal surgery.

IMPACT OF MULTIDISCIPLINARY CONFERENCE IMPLEMENTATION ON QUALITY OF RECTAL CANCER CARE AT A CANADIAN TERTIARY CENTRE.

P52

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Purpose/Background: Multidisciplinary conferences (MDC) have been associated with improved outcomes in cancer diagnosis, staging, and prognosis. Rectal cancer MDC is of particular interest given that multimodal treatment is critical for optimal care. The purpose of the study was to evaluate the impact of MDC implementation on quality of rectal cancer care using key quality indicators.

Methods/Interventions: A retrospective study was performed on prospectively collected data on rectal cancer patients treated at a Canadian tertiary centre before MDC implementation (April 2013 to June 2015) and after MDC implementation (July 2015 to October 2017). Inclusion criteria were all adult patients with curable stage I-III rectal cancer who had radical resection at our institution. The primary outcome was achievement of adequate surgical treatment of the primary disease (defined by pathology evaluation meeting three criteria: complete or near-complete total mesorectal excision on surgical pathology, negative distal and circumferential margins). Secondary outcomes included other rectal cancer care quality indicators: completion of local and distant staging, chemoradiation treatment in stage II and III disease, % of radiation-treated patients receiving preoperative therapy and use of synoptic reporting (radiology, operative, and pathology reports). Finally, we assessed the number of patients whose treatment plans were changed after MDC discussion. Descriptive statistical analyses were performed and outcomes for the group before MDC implementation (PreMDC) and after its implementation (MDC) were compared. Chi-square and Fisher exact tests were performed where appropriate to test for statistical significance between groups.

Results/Outcome(s): There were 169 patients in the PreMDC group and 161 patients in the MDC group. Baseline demographics were similar between groups, including mean age (62.2 ± 11.5 vs. 63.0 ± 11.7 years, $p=0.53$), gender (114/169 vs. 96/161 male, $p=0.14$) and stage (I/II/III/equivocal - 36/46/73/14 vs 44/33/78/6, $p=0.11$). There was no difference between PreMDC and MDC patients in achievement of adequate surgical resection (122/139 vs. 135/153, $p=0.90$; patients with missing pathology information not included). Local staging

by magnetic resonance imaging (MRI) of the pelvis or endorectal ultrasound (ERUS) was completed in most patients in both groups (86% vs. 91%, $p=0.32$). Similarly, staging evaluation of the chest (chest x-ray or CT) and abdomen (ultrasound or CT) was completed in most patients (95% vs. 98%, $p=0.74$). The only difference in staging observed was a higher proportion of MDC patients had MRI of the pelvis (93% vs. 60%, $p<0.001$). On evaluation of multimodality treatment, a higher proportion of MDC patients with clinical stage II and III disease received neoadjuvant chemoradiation (85% vs. 71%, $p=0.02$). Of those who received radiation, most were in the preoperative rather than postoperative period (94% vs 98%, $p=0.21$). Reporting MRI, operative, and pathology findings in synoptic form was significantly higher in the MDC group compared to the PreMDC group (55% vs. 16%, $p<0.001$; 82% vs. 38%, $p<0.0001$; 98% vs. 91%, $p=0.008$). After MDC, treatment plans were changed in 45/227 (20%) of conferences, where some patients were discussed at multiple MDCs. The change was due to new information on radiology review (67%), new information on pathology review (13%), new information on review of both radiology and pathology (4%), other reasons (11%), or unknown reasons (7%).

Conclusions/Discussion: Multidisciplinary cancer conference led to treatment plan changes in a significant proportion (20%) of patients with non-metastatic rectal adenocarcinoma. Although this did not translate directly into improved pathology-based surgical outcomes after MDC implementation, differences in MRI utilization and multimodality treatment were observed. Use of synoptic reporting also increased after MDC implementation, which was likely a direct impact of the communication between specialties at conference.

THE RELATIONSHIP BETWEEN AORTOILIAC CALCIFICATION AND LONG-TERM ONCOLOGIC OUTCOME IN PATIENTS UNDERGOING RECTAL CANCER RESECTION.

P53

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Purpose/Background: The interaction between host and tumor factors is an important determinant of long-term outcome following rectal cancer resection. Previous work has suggested that atherosclerotic disease of the distal aorta and pelvic vessels is associated with adverse short-term outcomes such as anastomotic leak following surgery for rectal cancer. The relationship with long term outcomes has, however, not been explored. At cellular level, hypoxia within the tumor microenvironment stimulates neovascularisation, alters tumor metabolism and is implicated in dissemination and metastases. At host

level, restriction in blood flow secondary to significant aortoiliac calcification (AIC) may impair rectal perfusion and contribute to a hypoxic tumor microenvironment, with subsequent adverse effects on cancer outcomes. We therefore aimed to investigate the relationship between AIC and long-term oncologic outcome in patients undergoing rectal cancer resection with curative intent.

Methods/Interventions: Clinical and pathological data from patients who underwent curative resection of non-metastatic rectal cancer over an 8-year period were abstracted from a prospectively-maintained database. Using staging CT images, the degree of AIC was determined by a visual assessment scale adapted from previously published literature. The number of calcified quadrants within the distal aorta and common iliac arteries at the level of the bifurcation was recorded. ROC analysis was used to determine the area under the curve, from which the optimum threshold for determining significant calcification was defined. Inter-relationships between AIC, host and tumor factors were assessed using the Chi-squared test. Recurrence and survival data were examined using univariate and multivariate Cox regression analysis.

Results/Outcome(s): Between 2008 and 2016, 181 patients with available staging CT imaging underwent resection of rectal cancer at a single institution. Most were male (60%), aged over 65 (54%), and had TNM stage II (37%) or III (37%) disease. Neoadjuvant therapy was administered in 79 patients (44%). Median follow-up was 63 (minimum 2) months. Significant AIC on CT was identified in 44 patients (24%). Age was associated with higher burden of AIC ($p=0.001$). No association was evident between AIC and other host factors including gender, ASA, BMI and smoking status in this cohort. There were no significant differences in rates of adverse tumor characteristics including higher T stage ($p=0.287$), node positivity ($p=0.918$), venous invasion (0.737) and margin involvement ($p=0.092$) when comparing patients with minimal AIC to those with significant AIC. Recurrence developed in 42 patients: local in 16 (9%) and systemic in 26 (14%) patients. Significant AIC was associated with systemic ($p<0.05$) but not local ($p=0.498$) recurrence. On multivariate Cox regression analysis, significant AIC (OR 2.71, (95% CI 1.24, 5.93), $p<0.05$) and TNM stage (OR 3.22 (95% CI 1.66, 6.25), $p=0.001$) were independent predictors of systemic recurrence. Cancer-specific survival (CSS) was related to age, TNM stage and significant AIC on univariate Cox regression. However, only significant AIC (HR 2.28, (95% CI 1.07, 4.86) $p<0.05$) and TNM stage (HR 1.83, (95% CI 1.10, 3.06), $p<0.05$) were independent predictors of CSS on multivariate analysis.

Conclusions/Discussion: In this cohort, a high burden of aortoiliac calcification was associated with systemic recurrence and cancer-specific survival following rectal cancer resection, independent of traditional determinants such as TNM stage. The degree of aortoiliac calcification appears to play a role in influencing oncologic outcome

following rectal cancer resection. While external validation is required, further investigation of the mechanism underlying this relationship is warranted.

THE IMPACT OF ANAL INTRA-EPITHELIAL NEOPLASIA ON DISEASE CHARACTERISTICS AND OUTCOMES IN PATIENTS WITH ANAL SQUAMOUS CELL CARCINOMA.

P54

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Purpose/Background: Anal squamous cell cancer (ASCC) is rare but its incidence continues to rise. Risk factors include the presence of pre-malignant anal intraepithelial neoplasia (AIN). The clinical relevance of the presence of AIN in ASCC specimens is not clear. We aimed to assess the prevalence of AIN in ASCC specimens within one health board and investigate the clinical significance of coexisting AIN within ASCC specimens.

Methods/Interventions: Patients diagnosed with non-metastatic ASCC (stages 1-3) between May 2008 and February 2018 were identified from a prospectively-maintained pathology database. Corresponding clinicopathological data were extracted from medical records. Logistic regression was used to assess the relationship between disease recurrence and tumor factors. The relationship between clinicopathological characteristics, cancer-specific survival (CSS) and overall survival (OS) was analysed using the Kaplan-Meier method and Cox proportional hazards regression. Statistical analyses were performed using IBM SPSS version 24.

Results/Outcome(s): Of 207 cases, most were female ($n=140$, 67.6%), over 65 years old ($n=140$, 67.6%) and had AJCC stage I or II disease ($n=144$, 69.6%). Initial treatment was chemoradiotherapy (CRT) in 137 (66.2%) and surgical excision alone in 60 (29.0%); 10 patients (4.8%) received no treatment. Specimens were obtained by excision in 53 patients (25.6%) and representative biopsy in 154 (74.4%). AIN was present in 120 specimens (58.0%: 69.8% of excisions and 53.9% of biopsies). The presence of AIN was related to smaller tumors (T1/T2, $p=0.001$), early AJCC stage ($p<0.001$) and HPV infection ($p<0.001$). Median follow up for survivors was 31 months (1-111 months) during which 55 deaths occurred. 41 deaths were cancer-related. Following CRT, 18 of 137 (13.1%) patients developed recurrent disease. Recurrence was local only in 14 patients (10.2%), distant in 2 patients (1.5%) and both local and distant in a further 2 patients (1.5%). On logistic regression, disease recurrence following primary CRT was associated with increasing T stage ($p<0.05$), N stage ($p<0.05$) and higher AJCC stage ($p<0.05$) but not the presence of AIN. On Cox regression analysis, AIN

was not related to overall survival (OS). Multivariate analysis confirmed older age (HR 2.02, 95%CI 1.48-2.75, $p<0.001$), higher AJCC stage (HR 3.41, 95%CI 2.22-5.24, $p<0.001$) and treatment type (CRT vs simple excision) (HR 2.10, 95%CI 1.39-3.17, $p<0.001$) to be independently related to poorer OS. Co-existing AIN related to improved cancer-specific survival (CSS) on univariate analysis (HR=0.48, 95%CI 0.26-0.89, $p=0.021$). However, on multivariate analysis this relationship was not independent of age (HR 1.05, 95%CI 1.02-1.07, $p<0.001$), AJCC stage (HR 3.65, 95%CI 2.25-5.93, $p<0.001$) and treatment type (HR=2.57, 95%CI 1.67-3.96, $p<0.001$).

Conclusions/Discussion: Our data suggests that AIN-associated squamous cell cancers have more favourable pathological characteristics and better cancer-specific survival than anal SCCs which are not associated with AIN. However, TNM staging remains the most important prognostic factor in anal SCC. Whether non-AIN associated ASCC represents a separate clinical and biological entity requires further investigation.

THE EFFECTS OF MISMATCH REPAIR DEFICIENCY SCREENING IN SURGICAL MANAGEMENT OF COLORECTAL CANCER.

P55

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Purpose/Background: Since 2012, all initial colorectal cancer (CRC) specimens submitted for pathologic evaluation at University of Iowa have been screened for Lynch Syndrome (LS) using a protocol that includes mismatch repair (MMR) protein immunohistochemistry. The diagnosis of LS has several implications for CRC management, including the extent of surgical resection, prognosis, surveillance interval, and familial screening. The aim of the current study was to determine the impact of MMR testing on surgical management of CRC.

Methods/Interventions: A retrospective review was performed on all patients with CRC specimens submitted to pathology between 2012 and 2017. Specimens underwent immunohistochemistry for MMR deficiencies: MLH1, MLH2, MSH6 and PMS2. For MLH1 deficient cancers, BRAF testing was performed. Sociodemographics, pathologic and genetic testing, and surgical management data were collected. Exclusion criteria included BRAF-mutated cancers and patients whose surgical care was provided elsewhere. Surgical management was classified as segmental resection (SR) or extended resection (ER), defined as total abdominal colectomy.

Results/Outcome(s): A total of 899 CRC specimens were examined and 138 (15%) were MMR-deficient. After excluding BRAF mutated patients and those surgically managed elsewhere, 51 (37%) patients were included in

the analyses. Mean age at diagnosis was 64 years (26-84) and approximately half were female (49%). Half of the cancers were right-sided (51%). MLH1 deficiency was most common (49%), followed by MSH2 (31%), MSH6 (14%), and PMS2 (6%). Thirty-nine patients (76%) were diagnosed preoperatively on initial colonoscopic biopsy with MMR deficiency and of those, 33 (85%) were referred to a genetic counselor (GC). Twenty-two patients (56%) were seen by a GC and 11 (28%) were eventually diagnosed with LS. Three of them underwent ER. Of the 12 patients diagnosed postoperatively with MMR deficiency, all underwent SR. The majority (58%) had emergent resection secondary to obstruction and an additional 2 (17%) were not diagnosed with cancer until after surgical resection. Five (42%) of these patients were seen by a GC and 3 (25%) were found to have LS.

Conclusions/Discussion: Since initiating the MMR deficiency screening on all CRC specimens, the majority of patients are identified preoperatively; of those who were not, most required an emergent operation. While most patients diagnosed with Lynch Syndrome did not undergo extended resection, this diagnosis remains important for preoperative counseling, subsequent surveillance, and familial management. Further studies should focus on understanding why some patients are not seen by a genetic counselor.

DIFFERENT ONCOLOGIC IMPACT OF MESOCOLIC LYMPH NODE METASTASIS BETWEEN RIGHT AND LEFT COLON CANCER AFTER CURATIVE COLECTOMY: RESULTS OF ANATOMICAL MAPPING OF HARVESTED LYMPH NODES IN 1,429 PATIENTS UNDERGOING D3 DISSECTION.

P56

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Purpose/Background: Quality of complete mesocolic excision (CME) determines oncologic outcomes in stage II-III colon cancer. Previous studies reported higher incidence of poor quality CME in right colon cancer compared to left colon cancer. In left colon cancer, high ligation of the inferior mesenteric artery (IMA) enables en-block resection of the entire regional mesocolic lymph nodes in a visceral package. In contrast, in right colectomy, mesocolon is "sliced off" from the superior mesenteric vein (SMV) and artery (SMA), which provokes a concern to breach mesocolic fat and lead to tumor spread within the peritoneal cavity and incomplete lymphadenectomy. We hypothesized that mesocolic lymph node metastasis would increase a risk for recurrence in right colon cancer, but not in left colon cancer. This study aimed to investigate differences in

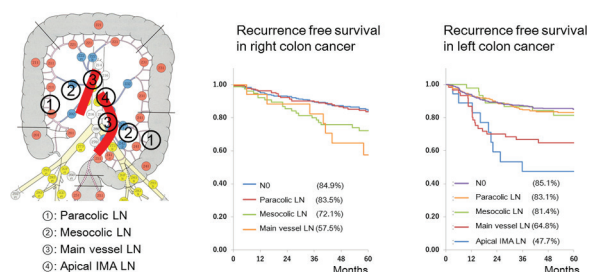
oncologic impact of mesocolic lymph node metastasis after curative resection of right and left colon cancer.

Methods/Interventions: A cohort with consecutive colon cancer patients undergoing R0 resection for stage II-III colon adenocarcinoma who underwent CME with central vascular ligation (CVL) and D3 dissection at a single comprehensive cancer center from 2004–2013 was investigated. Anatomical location of each harvested lymph node was mapped, and anatomical location of metastatic lymph node was recorded. Lymph node location was classified as follows (Figure): (1) “paracolic lymph node” located along marginal artery, (2) “mesocolic lymph node” located between marginal artery and SMV/SMA in right colon or superior rectal artery (SRA) in left colon, (3) “main vessel lymph node” located along SMV/SMA in right colon or SRA in left colon, and (4) “apical IMA lymph node” located at the root of IMA. Recurrence free survival (RFS) by anatomical extent of lymph node metastasis was investigated.

Results/Outcome(s): A total of 1,429 patients with a median follow-up of 58 months were eligible (right colon n=586, left colon n=843). In patients with right colon cancer (cecum n=137, 23.4%; ascending n=291, 49.7%; transverse n=158, 26.9%), 273 (46.6%) were male, and 428 (73.0%) underwent laparoscopic surgery. Median number of harvested lymph node was 22 (7-59). There were 308 (52.6%) N0, 196 (33.4%) N1 and 82 (14.0%) N2 diseases. One-hundred eighty-five patients had paracolic lymph node (31.6%, 66.5% in stage III), 76 had mesocolic lymph node (13.0%, 27.3% in stage III) and 17 had main vessel lymph node (2.8%, 6.1% in stage III) metastases. In patients with left colon cancer (descending n=81, 9.6%; sigmoid n=516, 61.2%; rectosigmoid n=246, 29.1%), 454 (53.9%) were male, and 681 (80.8%) underwent laparoscopic surgery. Median number of harvested lymph node was 17 (11-66). There were 427 (50.7%) N0, 315 (37.3%) N1 and 101 (12.0%) N2 diseases. Two-hundred ninety patients had paracolic lymph node (31.6%, 66.5% in stage III), 47 had mesocolic lymph node (5.6%, 11.3% in stage III), 61 had main vessel lymph node (7.2%, 14.7% in stage III) and 18 had apical IMA lymph node (2.1%, 4.3% in stage III) metastases. In both right and left colon cancer, anatomical extent of lymph node metastasis was associated with RFS (Figure). In right colon cancer, 5-year RFS was similar between N0 disease and paracolic lymph node metastasis, but was lower in mesocolic and main vessel lymph node metastases (84.9% in N0, 83.6% in paracolic, 72.1% in mesocolic, 57.5% in main vessel). In left colon cancer, 5-year RFS was similar among N0 disease and paracolic and mesocolic lymph node metastases, but was lower in main vessel and apical IMA lymph node metastases (85.1% in N0, 83.1% in paracolic, 81.4% in mesocolic, 64.8% in main vessel, 47.7% in apical IMA). Cox regression analysis revealed that anatomical distribution of lymph node metastasis was prognostic independently of N stage.

Conclusions/Discussion: As hypothesized, oncologic impact of mesocolic lymph node metastasis was significant

in right colon cancer but not in left colon cancer. In left colon cancer, mesocolic lymph node metastasis had similar outcomes to N0 and paracolic lymph node metastasis, suggesting oncological benefit of CME with high tie that enables en-block mesocolic lymphadenectomy within a visceral package. In contrast, in right colon cancer, mesocolic lymph node metastasis had a higher risk for recurrence compared to N0 and paracolic metastasis. In light of finding that nearly 30% of patients with stage III right colon cancer had mesocolic lymph node metastasis, careful attention is needed to avoid poor quality CME in stage III right colon cancer, and D3 dissection or at least complete D2 dissection are warranted to avoid incomplete lymphadenectomy. Anatomical classification of lymph node metastasis may add prognostic value to N stage.



PROPHYLACTIC GYNECOLOGIC SURGERY AT TIME OF COLECTOMY BENEFITS WOMEN WITH LYNCH SYNDROME AND COLORECTAL CANCER: A MARKOV ANALYSIS.

P57

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Purpose/Background: Women with Lynch syndrome have increased lifetime risks of colon, endometrial and ovarian cancer. Guidelines suggest that women with Lynch syndrome who have completed childbearing should be offered prophylactic hysterectomy and bilateral salpingo-oophorectomy (H-BSO) as a risk-reducing strategy for preventing gynecologic cancer. However, the benefit of prophylactic gynecologic surgery at time of colon cancer resection is unclear. We sought to determine likelihood of being alive and free from colon, endometrial and ovarian cancer based on operative choices for patients with Lynch syndrome undergoing surgery for colon cancer.

Methods/Interventions: A literature search was performed identifying studies with Lynch syndrome between 1950 and 2018 that described the risk of mortality and quality of life with prophylactic H-BSO performed alone or concurrently with oncologic colectomy for women with Lynch syndrome. Using Treeage Pro software, a Markov decision tree was constructed to compare outcomes of six surgical strategies in a hypothetical cohort of 30-year-old women with Lynch syndrome diagnosed with colon cancer. The main endpoints of

the decision analysis were quality-adjusted life-years (QALY) and likelihood of being alive and free from colon, endometrial and ovarian cancer at the end of 40 year follow up.

Results/Outcome(s): Survival and event risk percentages were calculated using a Markov model spanning forty years (Table 1). Events were defined as new diagnosis of ovarian or endometrial cancer, and recurrence of colorectal cancer. Patients who underwent a total abdominal colectomy (TAC) and H-BSO had the highest likelihood of being alive and cancer-free (73.6%), followed by TAC + H (71.5%). Segmental colectomy (SEG) alone had the lowest rates being alive and cancer free (38.5%). QALY were calculated at each ten-year period for forty years following surgery. The largest amount of QALY were calculated following TAC + H (8.02, 12.93, 16.05 and 17.87 QALY respectively for each subsequent decade after surgery). TAC alone was superior to TAC + H-BSO for the first 20 years (7.84 vs. 7.33 QALY in first decade, 12.48 vs. 12.28 QALY in the second decade). However, this trend flipped at 30 years post surgery (TAC 15.26 vs. TAC + H-BSO 15.43 QALY in the third decade and TAC 16.78 vs. TAC + H-BSO 17.28 QALY in the fourth decade).

Conclusions/Discussion: Our Markov cohort decision analysis demonstrated that the TAC + H-BSO at 30 years of age offered the highest event-free survival and lowest mortality for women with Lynch syndrome diagnosed with colon cancer. However, when taking quality of life into consideration, TAC + H at 30 years of age offered the most QALY at each subsequent decade after surgery spanning forty years. Additionally, the QALY benefit of only doing a prophylactic hysterectomy at time of colectomy offset the benefit of ovarian cancer prevention offered by BSO in the first twenty years following surgery. This is the first study demonstrating QALY advantage of prophylactic hysterectomy and the short-term advantage of not pursuing a concomitant BSO. Future trials should focus on evaluating these findings in a prospective manner.

DISPARITIES IN ADEQUATE NEOADJUVANT RADIATION DOSING FOR TREATMENT OF RECTAL CANCER.

P58

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Purpose/Background: Prior studies have raised concern that certain populations are less likely to access and receive appropriate cancer treatment, and that this may affect overall cancer survival. In rectal cancer treatment, receiving appropriate neoadjuvant chemoradiation has been associated with better survival. The purpose of this investigation was to evaluate whether demographic, hospital and clinical factors are associated with inadequate neoadjuvant radiation and overall survival in rectal cancer.

Methods/Interventions: The National Cancer Database (NCDB) was used to identify patients 18 years of age and older between 2006 and 2014 with clinical stage II and III rectal cancer who received neoadjuvant radiation. Patient demographic, hospital and clinical data points were analyzed to identify factors associated with receiving inadequate radiation dosing. Adequate radiation was considered to be between 4,500 and 5,040 centigray (cGy). Factors identified on bivariate analyses informed our multivariate analysis.

Results/Outcome(s): The study cohort was 27,988 patients with complete data; a total of 1,350 (4.82%) received inadequate radiation. Patients who received exactly 2500 cGy (n=232) were considered to be intentionally prescribed short-course radiation and were not analyzed. In multivariate analysis, female gender, age over 55 years old and government-provided insurance were significantly associated with inadequate radiation dosing (Table 1). Living less than 100 miles away from the hospital, metropolitan area location, academic setting, stage III disease and concurrent neoadjuvant therapy were

P57 Table 1: Outcomes of a forty-year Markov model for a cohort of 30-year-old women with Lynch syndrome and colon cancer.

	SEG	TAC	SEG + H	TAC + H	SEG + H-BSO	TAC + H-BSO
Risk (%)						
Event-free survival	38.50	43.00	65.90	71.50	67.80	73.60
Risk of recurrent CRC	0.80	0.20	1.40	0.40	1.40	0.40
Risk of endometrial cancer	19.50	21.30	1.80	2.00	1.80	2.00
Risk of ovarian cancer	1.30	1.40	1.80	2.00	1.10	1.20
Mortality	39.90	35.50	29.10	24.10	27.80	22.70
QALY (years)						
10-year interval	7.66	7.84	7.83	8.02	7.16	7.33
20-year interval	12.11	12.48	12.54	12.93	11.90	12.28
30-year interval	14.74	15.26	15.48	16.05	14.87	15.43
40-year interval	16.15	16.78	17.17	17.87	16.58	17.28

Abbreviations: subtotal colectomy (TAC), segmental colectomy (SEG), hysterectomy (H), hysterectomy with bilateral salpingo-oophorectomy (H-BSO), colorectal cancer (CRC), quality-adjusted life-years (QALY).

significantly correlated with receiving adequate radiation. Race and income were not significantly associated with radiation dosing. Receiving an inadequate dose of neoadjuvant radiation was associated with a higher risk of long-term mortality after adjusting for demographic, hospital and clinical characteristics (adjusted hazard ratio 1.36, 95%CI 1.23-1.52, $p < 0.001$).

Conclusions/Discussion: Demographic, socioeconomic and clinical factors including gender, age, insurance type, clinical stage and receiving neoadjuvant chemotherapy, as well as hospital proximity, location and type were significantly associated with radiation dosing in this analysis. It is unclear if any of these associations are causative, and whether systemic issues, physician bias or patient preference contribute to the difference in radiation dose. However, all these factors should be individually evaluated to determine if they can be modified, since patients who receive inadequate doses of neoadjuvant radiation experience worse outcomes.

MEDIUM RECTUM SQUAMOUS CELL CARCINOMA.

P59

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Purpose/Background: Squamous cell cancer of the rectum is a rare malignant neoplasm that occurs inside the layer of squamous cells of the rectum epidermis, representing only 0.3% of all histological forms of all epidermoids carcinomas. Epidemiologic data evidence

a predisposition to the development of the neoplasm in the female gender. The average age of the diagnosed patients range from 39 to 93 years old. The incidence corresponds to 0.1-0.25 in 1.000 cases of rectal cancer, while the majority of colorectal neoplasms are diagnosed as adenocarcinomas. It's occurrence may be simultaneous to chronic bowel inflammatory symptoms or mechanical irritation, in spite of the correlation is still be obscure. The most frequent clinical symptomatology consists of rectum bleeding, change in bowel habits, weight loss and abdominal or pelvic pain, similar to the adenocarcinoma main symptoms. The therapeutic approach isn't well established yet, considering the rarity of this neoplasm, but bases itself on neoadjuvant chemotherapy associated to radiotherapy, followed or not by surgical lesion resection according response to initial therapy.

Methods/Interventions: A 57 y.o. female with medical history of tenesmus associated to rectum hemorrhage and pelvic discomfort within the last 4 months presented for evaluation of the symptoms. Her past medical history was not relevant. During the diagnostic investigation, she underwent a digital rectal exam witch revealed a stenosing lesion approximately 4 inches from the anal margin, later confirmed by colonoscopy. The biopsy concluded the presence of squamous cell cancer of rectum. The images found on CAT scan, MRI and PET-CT were compatible with an extensive T3 lesion, starting from approximately 8cm from the anal margin until the peritoneal reflexion with lymph node enlargement in the perirectal tissue. The patient was then submitted to neoadjuvant radiotherapy (45.0 Gy) and chemotherapy (5- fluorouracil, 5-FU and leucovorin) followed by videolaparoscopic reosigmoidectomy with a ileostomy. The immunohistochemistry profile was positive

P58 Table 1: Multivariate logistic regression demonstrating associations with inadequate neoadjuvant radiation.

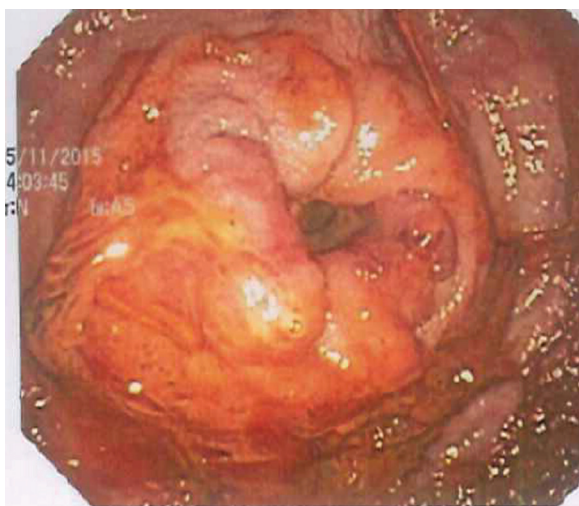
	Odds Ratio	95% Confidence Interval	P Value
Female gender	1.46	1.30-1.63	<0.001
Age over 50 years old	1.17	1.02-1.34	0.024
Race			
White (reference)	-	-	-
Black or African-American	0.91	0.72-1.14	0.393
Other	0.99	0.85-1.16	0.923
Insurance			
Private (reference)	-	-	-
Government*	1.19	1.12-1.27	<0.001
Uninsured	1.25	0.96-1.64	0.102
Unknown	0.97	0.79-1.18	0.788
Income (quartiles)	1.00	0.95-1.06	0.991
Living <100 miles from hospital	0.75	0.58-0.98	0.033
Metropolitan area	0.80	0.70-0.92	0.002
Academic setting	0.88	0.78-0.998	0.046
Clinical stage (II vs. III)	0.80	0.71-0.89	<0.001
Neoadjuvant chemotherapy	0.37	0.31-0.45	<0.001

*Medicare, Medicaid and other government-provided insurance.

for CK5/6, P63 and high molecular weight cytokeratin. Anatomopathological staging was ypT3 ypN0, lymph nodes (00/21) disease free. During the late post-operative (23 post-operative day) the patient developed a leakage due to partial posterior dehiscence of the colorectal anastomosis with formation of pelvic abscess treated clinically with intravenous antibiotics.

Results/Outcome(s): Six months after discharge from hospital, on the endoscopic evaluation for ileostomy closure, patient was diagnosed with actinic rectovaginal fistula above the puborectalis muscle and distal to the anastomoses and stenosis of the colorectal anastomosis. The patient is still in late follow up with ileostomy and no signs on physical examination and image exams of tumoral recurrence.

Conclusions/Discussion: Rectal squamous carcinoma cells is a rare malignant tumor, which is usually associated to inflammatory conditions and infections. The association with Human Papilloma Virus can be found in various squamous cancers but this relation with squamous carcinoma of rectal cells is yet unclear. Due to the rarity of this neoplasm in the rectum, the treatment is not standardized. As adopted in this case, actual trends of treatment goes toward the therapeutic mix which is the guidelines for squamous cell anal carcinoma and adenocarcinoma of the rectum. Usually the approach begins with neoadjuvant radiotherapy and chemotherapy even for stage I an stage II lesions followed by tumor resection for the non or incomplete responders, which was adopted in this case as a low anterior resection with total mesorectum excision (TME).



Stenosing lesion at 8cm of anal verge on colonoscopy.

IMPACT OF LACK OR POOR RESPONSE TO CHEMORADIOTHERAPY ON RADIAL MARGIN POSITIVITY RATES IN LOCALLY ADVANCED RECTAL CANCER-AN ACS-NSQIP ANALYSIS.

P60

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Purpose/Background: In the setting of multidisciplinary standardized care of patients with locally advanced rectal cancer (LARC) (cT3-T4, N0-2, M0) preoperative chemoradiotherapy (pre-CRT) and total mesorectal excision (TME) have become the mainstay treatment. Disease involved circumferential resection margin (+CRM) after total mesorectal excision for cancer is associated with a higher incidence of loco regional recurrence and distant metastasis. This study aimed to evaluate whether the lack of pre-CRT or the poor response to it is associated with higher CRM disease involvement in patients with LARC.

Methods/Interventions: A total of 1161 (LARC) (cT3-T4, N0-2, M0) patients were analyzed using the Proctectomy targeted National Surgical Quality Improvement Project (NSQIP) file from 2016-2017. Patients were categorized into three groups: patients who did not receive any pre-CRT (332 patients, 28.6%), patients who received and responded to pre-CRT (479 patients, 41.2%) and patients who received but did not respond to pre-CRT (350 patients, 30.2%). Response to treatment was determined using clinical AJCC pretreatment and final pathological staging. The primary outcome, radial margin positivity, was analyzed using stepwise logistic regression.

Results/Outcome(s): Disease involved +CRM was found in 86 (7.4%) cases. +CRM was noted in 11 out of 479 patients (2.3%) who underwent pre-CRT and responded to treatment, 30 out of 350 patients (8.6%) who did not respond or had a poor response to pre-CRT and in 45 out of 332 patients (13.6%) who did not receive pre-CRT ($p < 0.001$). Other factors that showed strong association with +CRM were Body Mass Index (BMI) lower than 30, open surgical approach, and lower third tumor location ($p < 0.05$). Regression analysis demonstrated that LARC patients that do not receive neoadjuvant therapy or have poor response to pre-CRT have respectively 6.6- and 4-times higher chances to have a +CRM when compared to patients with good response to pre-CRT ($p < 0.05$). (Table 1)

Conclusions/Discussion: In patients with LARC, omission of indicated pre-CRT (28.6% in this cohort) or poor response to pre-CRT are associated with increased risk of +CRM. More efforts are needed for standardized rectal cancer care with appropriate use of pre-CRT in LARC patients and adequate loco regional restaging post-CRT to improve patient outcomes by decreasing +CRM.

Table 1: Predictive model evaluated by stepwise logistic regression

Radial Margin	p value	OR	Standard Errors	95% CI
pre-CRT				
1. Did not receive pre-CRT	<0.0001	6.67	2.30	[3.40, 13.11]
2. No response to pre-CRT	<0.0001	4	1.44	[1.97, 8.08]
3. Good Response to pre-CRT (constant)				
Body Mass Index >30	0.01	0.45	0.13	[0.25, 0.80]
Minimally Invasive Approach	0.01	0.51	0.13	[0.31, 0.83]
Location of tumor				
1. Lower third	0.09	2.48	1.31	[0.88, 6.99]
2. Middle third	0.37	1.64	0.91	[0.55, 4.87]
3. Upper third (Constant)				

CLINICAL SYMPTOMS AND THE OUTCOME OF C. DIFFICILE INFECTION IN RECTAL CANCER PATIENTS AFTER RECTAL RESECTION AND ILEOSTOMY-REPAIR OPERATION.

P61

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Purpose/Background: There is a lot of evidences about higher incidence of *Clostridium difficile* infection (CDI) after ileostomy repair surgery. In especially, bowel frequency after rectal resection can make difficult to distinguish with the diarrhea from CDI. However, clinical symptoms and the outcome of CDI after low anterior resection and ileostomy repair surgery has not been clearly elucidated.

Methods/Interventions: From Jan 2004 to Jan 2018, total of 8327 of patient records were retrospectively reviewed of single tertiary colorectal cancer center. Clinical symptoms and the outcome of treatments were compared between ileostomy repair group (IRG) who underwent rectal cancer surgery, and colectomy group (CG).

Results/Outcome(s): CDI incidence was 2.3% (17/752) vs 0.41% (31/7575) between IRG and CG. All patients in IRG showed diarrhea as their initial symptoms and more bowel movements. (IRG; 13.56 ± 6.164 , CG; 8.39 ± 6.23 , $p=0.01$) Although, two patients in IRG were died from delayed diagnosis treatment, bowel frequency of IRG did not delayed diagnosis or discharge date than CG in statistical analysis. 14.6% (7/48) of CDI patients showed ileus as an initial symptom, and one of them died despite proper treatment for CDI. Post-operative ileus was associated with leukocytosis and delay of diagnosis.

Conclusions/Discussion: Incidence of CDI of IRG was higher than CG. Rectal cancer patients showed significant frequent bowel movement, but it seems not interfere CDI diagnosis and treatment. Rather, postoperative ileus might be a detrimental factor for diagnosis and treatment outcome. To reduce over-testing and delayed diagnosis in ileostomy repair and colectomy patients, further large-scale studies should be followed.

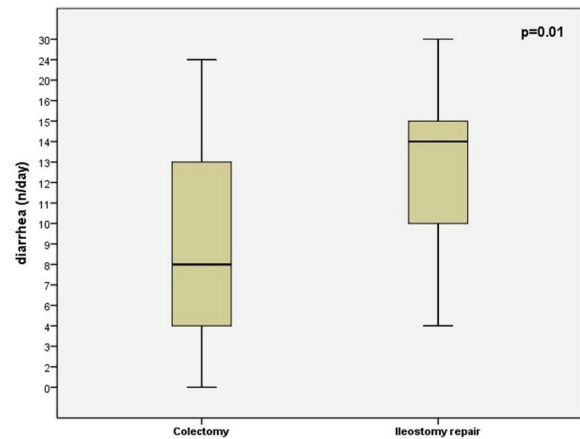


Figure 1. Bowel frequency (n/day)

THE DIAGNOSIS AND SURGICAL MANAGEMENT OF TAILGUT CYSTS: A RARE CASE REPORT.

P62

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Purpose/Background: Tailgut cysts, also termed retrorectal cystic hamartomas, are a very rare type of congenital cysts that are mainly located in the presacral space. Tailgut cysts are believed to be derived from the remnant of the embryonic hindgut. The symptoms of tailgut cysts are nonspecific and misleading. Therefore, a full understanding of the characteristics of tailgut cysts is important for their diagnosis and treatment.

Methods/Interventions: In the present study, we report a 46-year-old female with a 3 cm-sized cyst and multiple small cysts in the sacrococcygeal region. Pelvic magnetic resonance imaging (MRI) indicated several cystic masses, the largest of which had a diameter of about 2.8 cm, near the ligaments of the sacrospinous and rectum (Figure 1A and B).

Results/Outcome(s): The patient received complete surgical cyst resection, which was performed through the sacrococcygeal region. Pathological examination confirmed them as tailgut cysts, with no signs of malignant transformation (Figure 1C and D).

Conclusions/Discussion: MRI examination is important for the diagnosis of tailgut cysts. Unilocular or multilocular cystic appearance could be observed on MRI. Cysts are usually present with low signal intensity on T_1 -weighted images and high signal intensity on T_2 -weighted images. However, high signal intensity on T_1 -weighted images might also be observed because of the presence of mucinous material and haemorrhage within the cysts. A computed tomography (CT) scan can also reveal the location, margins, and connections with neighbouring structures of the tailgut cysts. Pathological examination remains the gold standard for the diagnosis of tailgut cysts.

However, radiologically guided biopsy can lead to haemorrhage, which might further induce infection of the cysts. Complete surgical resection through the sacrococcygeal region is vital to treat tailgut cysts. Using this technique, for cysts that seems invasive or malignant, biopsy can be performed. However, for the solid and resectable cysts, surgical resection should be performed immediately instead of a biopsy.

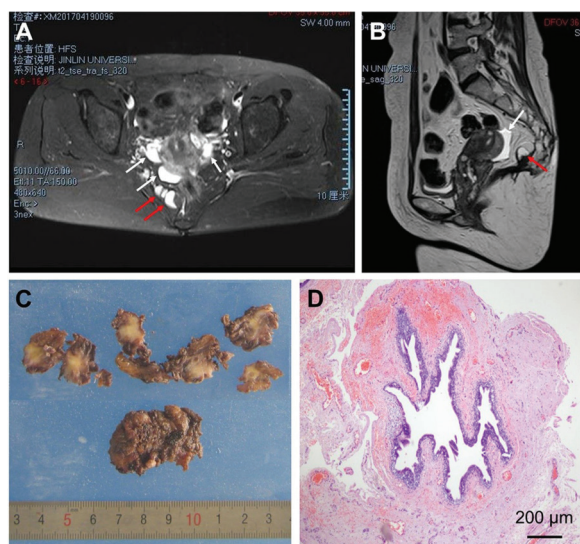


Figure 1. The MRI and pathological examination of tailgut cysts. MRI evaluation of the tailgut cysts in (A) cross-section and (B) longitudinal section. Red arrows indicate the tailgut cysts and white arrows indicate pelvic effusion. (C) Gross pathology of the tailgut cysts. (D) Histological examination (haematoxylin and eosin staining) of the tailgut cysts.

PURSESTRING VERSUS LINEAR SKIN CLOSURE AT LOOP ILEOSTOMY REVERSAL: A SYSTEMATIC REVIEW AND META-ANALYSIS.

P63

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Purpose/Background: There is no level 1a evidence regarding the best technique for skin closure at loop ileostomy reversal. The aim of this study was to evaluate whether purse string skin closure (PSC) is associated with lower surgical site infection (SSI) rates as compared to linear skin closure (LC).

Methods/Interventions: EMBASE, MEDLINE, Pubmed, Cochrane Library, Web of Science, and CINAHL databases were systematically searched. PSC was defined as a circumferential subcuticular suture leaving a small circular skin defect allowing for free drainage, granulation, and epithelialization. In LC, the wound edges were approximated side to side with or without drainage. The primary endpoint was SSI rate. Secondary endpoints included operating time, length of hospital stay, wound healing time, and incisional hernia rates. Inclusion criterion was any

observational or experimental study comparing PSC to LC in patients undergoing ostomy reversal.

Results/Outcome(s): Twenty studies (6 experimental and 14 observational) totaling 1,812 patients (826 PSC and 986 LC) were included. SSI rates were statistically and clinically significantly lower in patients with PSC [OR (95%CI) = 0.14 (0.09, 0.21); $p < 0.0001$; NNT = 6] in the meta-analysis of all studies. The subgroup analysis of randomized trials [OR (95%CI) = 0.10 (0.04, 0.21); $p < 0.0001$; NNT = 6] as well as the analysis of randomized trials including patients with loop ileostomy only [OR (95%CI) = 0.12 (0.05, 0.28); $p < 0.0001$; NNT = 5] confirmed this finding.

Conclusions/Discussion: This meta-analysis found that PSC was associated with significantly decreased rates of SSI in patients undergoing loop ileostomy reversal.

CLINICAL STUDY OF THE TST-STARR PLUS IN THE TREATMENT OF SEVERE PROLAPSED HEMORRHOIDS.

P64

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Purpose/Background: To assess the safety, efficacy and feasibility of stapled transanal procedures performed by a new dedicated device, TST STARR Plus, in the treatment of severe prolapsed hemorrhoids.

Methods/Interventions: 48 patients were enrolled in the study. Results of the procedure with perioperative complications, postoperative complications, the patient's satisfaction with the efficacy of operation, and recurrence rate were reported.

Results/Outcome(s): All patients were successfully performed in the mean of 23.5 minutes. The mean resected volume was 9.6 ml with a mean height of surgical specimen of 4.8 cm. In 26 pts, additional stitches on the suture line were needed (mean 1.7). Postoperative pain score of 2.5 points on the surgery day, the first defecation pain score of 3.8 points, the mean tenesmus scoring 2.9 points, CCF-FIS score mean of 2.3 points after 7 days surgery. The mean hospital stay was 7.2 days. The patient's satisfaction with the efficacy of operation was 9.8 after 48.3 months, no recurrence of prolapse was reported at a median of 48.3 months after surgery.

Conclusions/Discussion: TST STARR plus seems to be safe and effective for a tailored transanal stapled surgery for the treatment of severe prolapsed hemorrhoids.

LONG TERM OUTCOMES FOLLOWING LAPAROSCOPIC VERSUS OPEN RECTAL CANCER SURGERIES - A PROPENSITY MATCHED ANALYSIS FROM A SOUTH ASIAN TERTIARY CARE CANCER CENTRE.

P65

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Purpose/Background: Minimal invasive surgery in colorectal cancer has been in vogue since 1990. The benefits to the patient in terms of decreased post operative pain, decreased analgesic use and faster recovery of bowel function are obvious. However, the long term outcomes and oncological safety of laparoscopic surgery in colorectal cancer has always been a subject of concern. This study aims to analyze the long term outcomes of laparoscopic rectal cancer surgery as compared to open rectal cancer surgery.

Methods/Interventions: This is a retrospective propensity matched analysis of a prospectively maintained database from a tertiary care cancer centre. All curative intent rectal cancer resections performed between July 2013 and September 2015 were included in this study. Parameters studied were Overall Survival (OS), Disease Free Survival (DFS) and loco regional recurrence rates.

Results/Outcome(s): A total of 459 patients were included in this study initially. Propensity matching was done using 10 variables in a 1:1 ratio. The matched variables were age, gender, ASA (American society of Anaesthesiologists) grade, distance of tumor from anal verge, clinical T stage, clinical N stage, clinical M stage, initial CRM (Circumferential Resection Margin) status, sphincter preserving surgery and neoadjuvant treatment. Finally, 256 patients were classified into 2 groups – 129 patients in laparoscopy arm and 127 patients in open arm. The overall median follow up was 47 months. OS at 4 years was 79.5% in open arm and 72.1% in laparoscopy arm ($p=0.105$). Stage wise analysis of OS did not show any statistically significant difference between both the arms. Overall DFS at 4 years was 61.2% in the open arm and 64.3% in the laparoscopy arm ($p=0.715$). Stage wise analysis of DFS also did not show any statistically significant difference between both the arms. The total recurrence rates were similar in both the arms. The loco regional recurrence rates were also not found to be significantly different between both the arms - 12.59 % in the open arm and 11.62 % in the laparoscopy arm.

Conclusions/Discussion: There is no significant difference in OS, DFS and loco regional recurrence rates between laparoscopic and open rectal cancer surgeries. In the Indian subcontinent, where rectal cancers present at a younger age and the proportion of signet ring cancers is more than 10 percent, more than 40% patients can have early recurrence in spite of neoadjuvant treatment. The

survival outcomes of this study are comparable to other studies in existing literature. In short, laparoscopic rectal resection is comparable to open rectal surgery with respect to long term survival outcomes and does not compromise oncological safety.

SHORT TERM OUTCOMES FOLLOWING LAPAROSCOPIC VERSUS OPEN RECTAL CANCER SURGERY POST NEOADJUVANT RADIOTHERAPY-A PROPENSITY MATCHED ANALYSIS FROM A SOUTH ASIAN TERTIARY CARE CANCER CENTRE.

P66

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Purpose/Background: Laparoscopy in colorectal cancer surgery has always been the subject of debate in the last two decades. The benefits of minimal invasive surgery to the patient in terms of decreased post operative pain and faster recovery of bowel function are obvious. However, the other short term outcomes and the oncological safety of laparoscopic surgery in post radiotherapy patients is still a matter of concern. This study aims to analyze the short term outcomes of laparoscopic rectal cancer surgery as compared to open rectal cancer surgery in patients post neoadjuvant radiation treatment.

Methods/Interventions: This is a retrospective propensity matched analysis of a prospectively maintained database from a tertiary care cancer centre. All curative intent rectal cancer resections post neoadjuvant radiotherapy performed between January 2014 and December 2017 were included in this study. Parameters studied were pathological Circumferential Resection Margin (path CRM) positive rates, total nodes harvested, distal margin status, complication rates, anastomotic leak rates, blood loss and post operative hospital stay.

Results/Outcome(s): A total of 697 patients were included in this study initially. Propensity matching was done using 9 variables in a 1:1 ratio. The matched variables were age, gender, ASA (American society of Anaesthesiologists) grade, distance of tumor from anal verge, clinical T stage, clinical N stage, initial CRM (Circumferential Resection Margin) status, sphincter preserving surgery and type of neoadjuvant treatment. Finally, 490 patients were classified into 2 groups - 245 patients in the laparoscopy arm and 245 patients in the open arm. The path CRM positive rates were 6.1% in the open arm and 5.3% in the laparoscopy arm ($p = 0.697$) and the distal margin positive rates were 1.2% in the open arm and 0.4% in the laparoscopy arm ($p=0.315$). The mean total number of nodes harvested were similar in both the groups ($p=0.76$). The rates of non serious complications (Clavien Dindo grade I and II) was 25.7% in

the open arm but only 16.3% in the laparoscopy arm. The rates of serious complications (Clavien Dindo grade III-V) were also similarly higher in the open arm (12.2%) as compared to the laparoscopy arm (6.5%) and this parameter was found to be statistically significant ($p=0.001$). Patients undergoing laparoscopy surgery had a much lower anastomotic leak rate than those in the open arm (1.6% versus 5.7%, $p=0.018$) The mean blood loss was greatly minimized in the laparoscopy arm (346 ml) as compared to the open arm (908 ml) ($p<0.001$) with only 3.7 % lap cases requiring blood transfusion as against 17.6% open cases. The mean post operative hospital stay was similar in both arms (8 days in lap and 9 days in open).

Conclusions/Discussion: Laparoscopic rectal surgery has significantly better perioperative short term outcomes as compared to open rectal surgeries with respect to decreased complication rates, decreased anastomotic leak rates and decreased intra operative blood loss. There is no significant difference regarding oncological outcomes in both the groups. Hence, laparoscopic proctectomy is definitely superior to open proctectomy in the neoadjuvant radiotherapy setting.

PATHOLOGY REPORTING OF RECTAL CANCER SPECIMENS: WHAT WE CAN DO BETTER.

P67

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Purpose/Background: The successful treatment of rectal cancer requires careful management by a multi-disciplinary team. As surgery is an important part of the treatment algorithm, colorectal surgeons are required to perform the best possible resection, notably by adhering to oncologic principles. Margins, lymph node yield, intactness of total mesorectal envelope (TME) and other metrics are used as standards to gauge adequacy of the surgical specimen. Through this reporting, the pathologist has the potential to provide feedback to the colorectal surgeon regarding his or her technique. In addition to using specimen completeness to guide adjuvant management and surveillance. It is therefore important to establish an objective standardized way to report on specimens that can be easily referenced and utilized. One readily available method is to use pathology reports, particularly as The College of American Pathologists (CAP) has provided a validated rectal cancer reporting protocol. In order to improve reporting by adapting this guideline, we first had to assess our current reporting method for strengths and weaknesses.

Methods/Interventions: Two-hundred twenty-seven patients diagnosed with rectal cancer who underwent surgery with curative intent at a community teaching hospital system from 1/5/2010 to 11/8/2018 were included in this study. All patients underwent either an

abdominoperineal resection, low anterior resection, or low anterior resection with diverting loop ileostomy. Local excisions were excluded. Final operative and pathology reports were reviewed for each patient. Using the CAP protocol as a guideline, metrics were pulled including procedure reported by the surgeon, procedure as listed by the pathologist, gross specimen evaluation, completeness of TME, grade of cancer and T/N staging.

Results/Outcome(s): Of the 227 patients included in this study, 213 (93.8%) had different procedures reported by the surgeon and the pathologist. The highest reported parameters at greater than 90% were lymphovascular invasion (207, 91.2%), tumor extension (208, 91.6%), tumor size (223, 98.2%), perineural invasion (206, 90.8%), histology type (209, 92.1%), histology grade (206, 90.8%), and T/N staging (215, 94.7%). Interestingly, even though 225 (99.1%) commented on overall margin status, 50 did not go into further detail. There was less than 50% reporting on intactness of TME (92, 40.5%), tumor budding (1, 0.4%), or location of tumor (106, 47.1%).

Conclusions/Discussion: Maintaining oncologic principles at surgical resection of rectal cancer has led to improved incomes. In order to help colorectal surgeons operate effectively, it is important to have a reliable way to evaluate completeness. Using the CAP guidelines as a reference, the current system was first examined for strengths and weaknesses. While over 90% of the pathology reports comment on the key areas of lymphovascular invasion, tumor extension, tumor size and histology type and grade, several areas of improvement were identified. Less than half of the reports mentioned the quality of TME, and these were noted only in the narrative portion. While most reports commented on margins in a general sense, nearly one in five did not specify proximity to individual margins. These can be targeted for improvement by implementing a template based on the CAP protocol for the examination of specimens. Using these results, a comprehensive system of communication and feedback could be used to improve the surgical care of patients with rectal cancer.

INTRAOPERATIVE COLONOSCOPY CAN FIND COMPLICATIONS OF ANASTOMOSIS EARLY IN COLORECTAL SURGERY.

P68

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Purpose/Background: Anastomotic complication is a serious problem in colorectal surgery, particularly in left-sided colorectal surgery. This study investigates the effectiveness of intraoperative colonoscopy in prevention of early anastomotic complication.

Methods/Interventions: A retrospective review on patients who underwent left-sided colorectal cancer surgery with circular stapled anastomosis from Jan. 2015

to Sept. 2018 was conducted. Intraoperative colonoscopy (IOC) was performed to detect anastomotic bleeding and disruption from Dec. 2016. Patients were grouped into two via procedural difference: one without IOC, IOC (-), and the other with IOC, IOC (+). Rate of postoperative anastomotic complication was analyzed and compared in two groups

Results/Outcome(s): A total of 411 patients were included in this study – 220 patients in IOC (-) and 191 patients in IOC (+). There was no difference in age, sex and the level of anastomosis in two groups. Comparing the rate of bleeding and leakage, a statistically significant difference was not found in two groups. Among 191 patients in IOC (+), abnormal finding, such as bleeding, hematoma, and/or anastomotic disruption, was noticed in 33 patients. Additional intraoperative procedure, such as transanal suture of anastomosis, was performed in 22 patients in them. Only one incidence of colonic ischemia in proximal limb occurred in the patients who received additional intraoperative procedure, while anastomotic bleeding or leakage did not.

Conclusions/Discussion: In IOC (+) group, anastomotic bleeding was detected at relatively high rate, and additional intraoperative procedure was subsequently performed. However, the overall anastomotic complication rate was not different in two groups. Although this study is limited by its retrospective nature and not randomly controlled, IOC is relatively simple and does not cause any complication. Moreover, abnormal finding indicated by IOC leads to additional procedure that further prevented anastomotic leakage and bleeding. Therefore, IOC may be an option to prevent early anastomotic complication.

ANATOMICAL IDENTIFICATION OF TRANS-ABDOMINAL TME TERMINAL LINE AND TRANS-ANAL TME START LINE.

P69

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Purpose/Background: Purpose/Background: Problem Statement: Trans Anal total mesorectal excision (Ta TME) approach aimed to overcome pelvic limitation challenges as it was easy to locate the lower margin of the tumors through the rectal cavity. However, the literature hadn't reported any data regarding intraluminal mesorectal tail identification to grantee its complete excision whenever needed. on performing Ta TME for high rectal cancer, 5cm distal to the lower edge of the tumor can be determined as a safety bowel wall margin and safety mesorectal margin. Several studies had reported that was the recommended start line of dissection which met the guidelines for high rectal cancer radical resection. However, for mid and low rectal cancer radical surgery, the guidelines recommended the distal safety bowel wall margin to be only 2cm but the

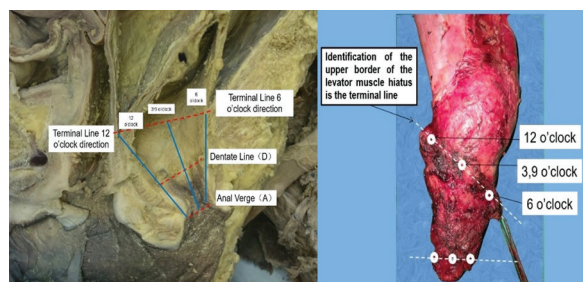
distal mesorectal safety margin should be 4 to 5cm or even total mesorectal excision is needed. **Study purpose:** is to identify the start line of Ta TME approach which is corresponding to the endpoint of the mesorectal tail end that can guarantee its complete excision for necessary cases

Methods/Interventions: This descriptive study was done on 26 cadavers and 16 post ELAPE surgical specimens. All included specimens were treated according the ethical considerations mentioned in the informed consent. We were first to identify histologically the end of the mesorectal tail (terminal line) using the post ELAPE surgical fresh specimens and settle a gross description for surgeons identification. Then, a digital ruler was used to measure the distance between that line and both the dentate line and the anal verge to be able to identify the start line intraluminally representing the end point of the mesorectum. we meseasured the distances in three directions 12, 3or9 and 6 o'clock to investigate whether the end level of mesorectal tail will be affected by the anorectal angulation or not on performing Ta TME.

Results/Outcome(s): Histologically, The transabdominal TME terminal line which is considered the end point of the mesorectal tail was found to be at the upper border of the levator ani hiatus in all examined post surgical fresh specimens picked up at 12, 3or9 and 6 o'clock directions with no extension of the mesorectal tissue below that level. The pre-sacral fascia was found to be attached to the proper fascia of the rectum also at the same level of 3or9 and 6 o'clock directions while at 12 o'clock direction the Denonvilliers' fascia extended downward without attaching to the proper fascia of the mesorectum. That line can be identified grossly as an annular pearly white fascial structure at the upper border of the levator ani hiatus extending from 2 o'clock to 10 o'clock posteriorly while couldn't be found anteriorly in dissected cadaveric specimens. Ta TME start line of dissection is an imaginary intraluminal corresponding line to the mesorectal tail end level (similar to trans-abdominal Terminal Line) and due to the angulation of the anorectal junction by puborectalis muscle sling, the start line was found of significantly different levels at 12 o'clock, 3or9 o'clock and 6 o'clock directions. The distances from that line to the dentate line at those directions in cadaveric specimens were 22.85 ±4.31, 18.35 ±3.84 and 15.63 ±3.30 mm respectively while the distances in the post-surgical specimens were 28.61±5.43, 21.90 ± 3.58 and 15.63 ± 3.58 mm respectively with no statistical significance between male and female.

Conclusions/Discussion: we concluded that Ta TME start line of dissection for mid and low rectal cancer shouldn't be at the same level circumferentially due to the angulation of the anorectal junction by puborectalis muscle sling making the mesorectal tail end at 12 o'clock direction of longer distance a way from the dentate line or the anal verge than its end at 6 o'clock direction which considered of great oncological value. Moreover, the ano-colic anastomosis similarly will be of different

distances away from the anal verge and so the decision of performing guarding ileostomy after low anterior rectal resection should put in consideration that the anastomosis will be of significantly closer distance to the anal verge at 6 o'clock than 12 o'clock directions.



Cadavric and post ELAPE Samples show the end of the mesorectal tail *Terminal Line" at the upper border of the levator hiatus with different distance between the Terminal line and the Dentate line at 12 o'clock and 6 o'clock directions due to the angulation of the Anorectal junction

IMPLEMENTATION COSTS FOR ENHANCED RECOVERY AFTER SURGERY (ERAS) PROTOCOLS – PRACTICAL OR PROHIBITIVE?

P70

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Purpose/Background: Implementation of enhanced recovery after surgery (ERAS) protocols into hospital practices for colorectal surgery have been shown to be beneficial. A notable advantage of ERAS protocols is the ability to optimize healthcare outcomes by facilitating a faster postoperative recovery and decreasing length of stay and resource utilization without increasing readmission rates or complications. As a result, ERAS protocols are associated with an overall decrease in hospital costs. While this cost-efficiency has been well documented in the current literature, the implementation costs associated with beginning an ERAS program are not well described. The aim of this review is to evaluate the current literature to determine the financial investment required to implement an ERAS protocol.

Methods/Interventions: A systematic review of the literature was conducted on Pubmed using the key terms ERAS, enhanced recovery pathways (ERP), colorectal, implementation and cost. All relevant English articles published between 1995 and 2018 which performed a cost-analysis including implementation costs of an ERAS program, were examined and discussed in this review. Cost data were converted to United States dollars based on the exchange rate at the end time of the study period and rounded to the nearest whole number to enable a more standardized comparison of studies. Each study was independently assessed for eligibility and the data was extracted.

Results/Outcome(s): Substantial studies in the literature related to cost-analysis of ERAS in colorectal surgery patients were identified, but only eight studies presented ERAS implementation costs. Of these, one did not distinguish the implementation cost from the overall hospital spending and was therefore excluded. The remaining seven were included for review. These articles represent the experience with ERAS protocols in five different countries with universal health care systems (Table 1). The institutions include public and referral hospitals, and multi-institutional collaborations consisting of community and referral hospitals. No institution self-identified as a safety-net hospital. The most common study design used was a case-controlled retrospective review, in addition to a prospective cohort study and a retrospective review. The studies evaluated a range of 50 to 1295 patients with an ERAS protocol implemented between 5 to 22 months (mean, 16). Each study compared costs between conventional care (CC) and ERAS patients. Reported ERAS implementation costs ranged from \$56 to \$1268 per patient, with a mean of \$742. While four of the studies included the costs of a multi-disciplinary team training and for personnel necessary to implement and maintain the ERAS program, two studies omitted this expense and one did not provide enough information. The average hospital cost was \$13,804 and \$11,523 for CC and ERAS patients respectively, resulting in an average cost savings of \$3,394 per patient. Only two studies evaluated additional data related to healthcare system and society costs, both of which reported savings in ERAS patients.

Conclusions/Discussion: Although ERAS protocols have demonstrated their ability to lower costs for patients, hospitals, and society; there are inherent necessary implementation costs. In our literature review, only seven studies were identified which described the costs required to develop and implement these programs. There was a wide-range of implementation costs reported and only five studies included compensation for necessary personnel as part of this cost. These initial costs may present an obstacle to safety-net hospitals with limited resources. The heterogeneity of these studies make it difficult to ascertain challenges in the United States with implementation of these protocols. Therefore, the costs to implement an ERAS program should be better defined.

Table 1. Characteristics of included studies.

Author (yr)	Country	Perspective	Study Type	No. of pts	Time (mos)	ERAS Implementation Cost (PP \$)	Additional Costs of ERAS Program (PP \$)		
							Hospital	Healthcare System	Society
Sammour et al (2010)	New Zealand	Referral	Case control	CC: 50	16	1458*	CC: 16392	6399	--
				ERAS: 50		ERAS: 9993	--	--	
Reinler et al (2013)	Switzerland	University	Case control	CC: 50	5	1268	CC: 30485	3338	--
				ERAS: 50		ERAS: 33823	--	--	
Lee et al (2015)	Canada	University	Cohort	CC: 95	12	124	CC: 9573	932	CC: 11479
				ERAS: 95		ERAS: 8641	--	ERAS: 14220	
Stone et al (2015)	US	University	Retrospective	CC: 330	12	1106*	CC: 10933	1897	--
				ERAS: 500		ERAS: 9036	--	--	
Nelsson et al (2016)	Canada	6 hospitals	Case control	CC: 116	22	676	CC: 8088	6188	--
				ERAS: 674		ERAS: 1900	--	--	
Thambi et al (2016)	Canada	6 hospitals	Case control	CC: 331	21	503*	--	--	CC: 4178
				ERAS: 1295		ERAS: 1000	--	ERAS: 2343	
Portinari et al (2018)	Italy	University	Case control	CC: 100	24	56	CC: 7352	1610	--
				ERAS: 100		ERAS: 5742	--	--	

PP, per patient; CC, conventional care

Original currency is converted to US dollars with the conversion factor based on the exchange rate at the end time of the study period and rounded to the nearest whole number

*Does not include personnel costs for implementation

Includes data from prior published data (Wick et al PMID: 26278010)

*Exact year cost, cost per patient one-year is projected to be \$714

**OPTIMIZING ERAS FLUID MANAGEMENT:
ASSOCIATION OF INTRAOPERATIVE FLUID
VOLUME AND RECOVERY FOLLOWING
COLORECTAL SURGERY.**

p71

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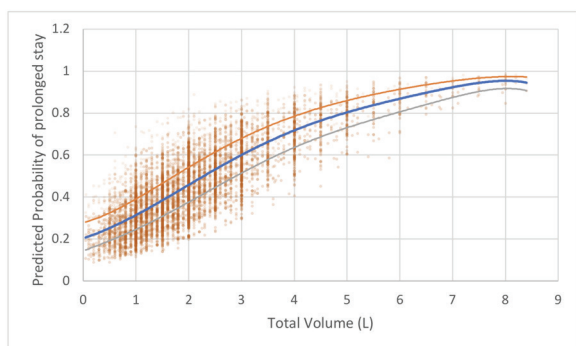
Purpose/Background: Enhanced Recovery after Surgery (ERAS) guidelines are advocated for colorectal surgeries to improve recovery after surgery and shorten length of hospital stay. The primary objective of this study was to determine the association of the volume of intraoperative fluid with prolonged LOS defined as greater than the median LOS. The secondary objectives were to determine patient and surgical factors that were associated with prolonged LOS.

Methods/Interventions: Prospective data was collected on patients undergoing colorectal surgery at 15 academic hospitals across Ontario, Canada from September 2012 to April 2015. Variables included demographics, perioperative compliance with ERAS guidelines and patient outcomes, including readiness for discharge and postoperative complications were collected. Multivariable analysis was used to examine the relationship between patient and surgical variables with prolonged LOS and postoperative complications. Data was summarized as mean and standard deviations for continuous variables; and frequencies and proportions for categorical variables. Multivariable analysis examining patient demographic and procedural factors related to prolonged LOS, 30-day postoperative complications and readmission were calculated using logit-based generalized estimating equations to provide odds ratio estimates and 95% confidence intervals (CI). A compound symmetry covariance structure was used. Predicted probabilities of prolonged LOS were determined based on this model and graphed by volume of fluid administered to provide a visual representation of the association.

Results/Outcome(s): 2,924 patients were entered in the program. 2876 (98%) were retained as part of the cohort based on completeness of data, 78 (3%) were excluded. 1802 patients underwent colonic (64.4%) and 996 had rectal resection (35.6%). Intraoperative fluid therapy was predominantly a balanced salt solution, with a volume of 2.07 ± 1.2 L. Mean LOS was 5 days. Median LOS for the excluded, population was the same as the entire population considered in further analysis. Patients were divided into 2 groups for analysis, ≤ 5 days vs > 5 days. Of patients who had a LOS ≤ 5 days, 72.6% had a colonic procedure and 27.4% underwent rectal surgery. Of patients who had a LOS > 5 days, 54.8% had colonic surgery and 45.2% had rectal surgeries. This is in keeping with the higher complexity of rectal surgery, as 58.5% (583) of patients undergoing rectal surgeries had LOS > 5

days. Both groups were comparable for age, height, weight, BMI and gender. Logistic regression analysis identified intraoperative fluid volume per liter (OR): 1.54, (CI): 1.36 – 1.75, $p < 0.001$, Charlson co-morbidity score ≥ 3 (OR: 1.59; CI: 1.13 - 2.23, $p = 0.008$), preoperative anemia (OR: 1.58, CI: 1.36 - 1.82, $p < 0.001$) and surgical duration (\geq median) (OR: 1.55, CI: 1.27 - 1.89, $p < 0.001$) to be significantly associated with increased LOS. Oncology cases were less likely to have a prolonged LOS (OR: 0.54, CI: 0.44 to 0.67, $p < 0.001$). There is a multivariable relationship between the probability of prolonged LOS and the fluid volume administered intraoperatively, ($p < 0.001$). The spline curve indicates a positive correlation between volume of fluid administered intraoperatively and LOS. Patients with LOS ≤ 5 days received 1741 \pm 982 ml, those with LOS > 5 days received 2470 \pm 1346 ml intraoperatively. There is 1.5 times increased risk of prolonged LOS with every liter increase in intraoperative fluids ($p < 0.001$). There was a significant association between comorbidity (3+ Charlson co-morbidity scores) and LOS > 5 days ($p = 0.008$). Pre-existing anemia had 1.6 times higher odds of increased LOS (OR: 1.6, $p < 0.001$). Increased OR time was associated with increased LOS ($p < 0.001$) Patients with LOS ≤ 5 days had lower number of epidural insertions [(18.4% in LOS ≤ 5 days vs 38.5% in LOS > 5 days), and lower rate of intraoperative blood transfusion. Blood transfusion and other events were more common in patients with LOS > 5 days. SSI, anastomotic leaks, urinary tract infections and VTE events were significantly more common among those with a LOS > 5 days. Readmission was similar (7% LOS ≤ 5 days vs 9.6% LOS > 5 days). LOS after re-admission was significantly higher for those who had a previous LOS > 5 days (10.7 ± 8.6 days) vs the ones whose original LOS was ≤ 5 days (3.7 ± 1.0 days, $p = 0.04$).

Conclusions/Discussion: This study highlights that use of ERAS protocols along with restrictive fluid approach, while maintaining MAP > 65 mmHg shortens the LOS and decreases morbidity. There is a 50% increased risk of prolonged LOS with every liter increase in intraoperative fluid administration suggesting a dose-response relationship between intraoperative fluids and LOS. The presence of pre-existing anemia, co-morbidities (3+ Charlson co-morbidity score) and increased duration of surgery prolong duration of hospital stay.



The multivariate relationship between probability of prolonged length of stay and fluid volume in liters. Solid blue line represents the mean predicted probability of prolonged stay, upper and lower solid red lines represent the 95% confidence interval for the predicted probability

TRADITION VERSUS VALUE: IS THERE UTILITY IN PROTOCOLIZED POSTOPERATIVE LABORATORY TESTING AFTER ELECTIVE COLORECTAL SURGERY?

P72

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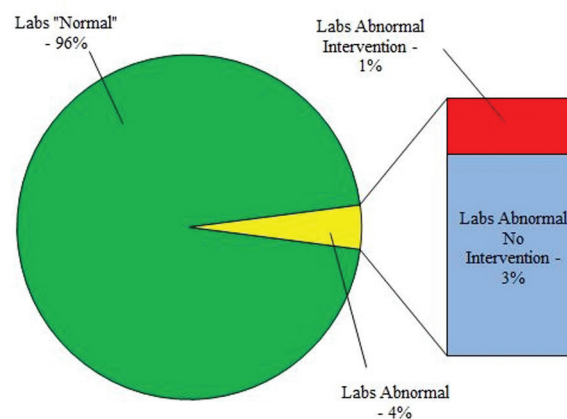
Purpose/Background: Enhanced recovery pathways (ERPs) are becoming the standard of care for elective colorectal surgery (CRS). Frequently, these pathways include laboratory testing on all patients. Our institutional CRS ERP includes a routine post-operative day (POD) 1 blood draw that consists of a complete blood count and potassium, glucose, and creatinine measurements. Whether these routine, protocolized labs are value-added tests that drive patient care is unknown. Therefore, we sought to determine whether protocolized postoperative lab testing embedded in a CRS ERP order set is clinically warranted and what the associated cost is.

Methods/Interventions: Patients undergoing elective laparoscopic or open colectomy or ostomy reversal between 1/1/2015 and 12/31/17 within the division of colon and rectal surgery at our tertiary care institution were identified. Pre-operative labs within a month of surgery, the first routine set of postoperative labs collected before 0800 on POD 1, and intervention in response to abnormal values were reviewed. Abnormal lab values were defined as a hemoglobin < 8 g/dL, potassium ≥ 5.3 - 5.9 mmol/L (hyperkalemia) or ≥ 6.0 mmol/L (severe hyperkalemia), glucose > 180 mg/dL in non-diabetic patients, and creatinine > 1.3 g/dL. Costs associated with laboratory testing were calculated using dollar amounts representing Medicare reimbursement; actual costs to the institution and patient may vary.

Results/Outcome(s): A total of 2,478 patients were identified. 2,472 (99.9%) had at least one lab drawn before 0800 on POD 1. Of patients with a preoperative hemoglobin ≥ 8 g/dL ($n=2,427$), only 79 (3.2%) were < 8 g/dL on the scheduled POD 1 check; 21 (0.9%) patients received a blood transfusion in response to this lab and symptoms.

Hyperkalemia and severe hyperkalemia were noted in 124 (5.0%) and 9 ($< 0.5\%$) patients, respectively, but medical intervention to lower potassium was performed in only 14 (0.6%) patients. Within non-diabetic patients ($n=1,930$), only 67 (3.5%) had an initial postoperative glucose level > 180 mg/dL, and even fewer ($n=11$, 0.6%) were placed on sliding scale insulin during their hospitalization. Lastly, only 98 (4.2%) patients had a newly abnormal creatinine on POD 1, with only 37 (1.6%) treated. In summary, 8,816 (95.9% of all POD 1 labs) revealed "normal" results, and of the 377 (4.1%) abnormal results, only 83 (0.9%) resulted in active clinical intervention. Each set of protocolized labs within the current study would bill Medicare \$30.60, yielding a total estimated cost avoidance of \$71,588.87 for these selected procedures across three years if protocolized labs had not been ordered.

Conclusions/Discussion: Protocolized POD 1 laboratory testing as part of our institutional CRS ERP following elective procedures rarely revealed abnormal findings. Additionally, these abnormal results infrequently required any significant clinical interventions beyond a simple recheck. In an increasingly "value-driven" clinical environment, protocolized POD 1 labs after elective colorectal surgery appear to add little value to care. Increased resource utilization and cost of care without impact on clinical care defines non-value added care. Protocolized laboratory testing should be replaced with clinically-based criteria to trigger laboratory investigations.



RECTAL PAIN AND CT UTILIZATION IN THE EMERGENCY DEPARTMENT.

P73

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Purpose/Background: In the recent decades, there has been increasing utilization of computed tomography (CT) scans. Some studies suggest that up to 20-50% of imaging studies do not add valuable information regarding a patient's plan of care. Inappropriate imaging not only increases healthcare costs, but it also exposes patient's

to unnecessary radiation. Anorectal diagnoses are largely made based on physical exam without the need for further tests. Therefore, the objective of this quality improvement project is to evaluate the utilization of CT scans in patients who present to the emergency department with the complaint of rectal pain.

Methods/Interventions: This is a retrospective analysis data collected from a single institution from July 2015 to June 2018. Patients included in this study were >18 years old who presented to the emergency department with the chief complaint of rectal pain. Demographic information, CT scan utilization, and documentation of anorectal exam were analyzed.

Results/Outcome(s): There were 40 patients, ages 20-69 (mean age 39). There were 24 males (60%) and 16 females (40%) in this sample. All patients had a documented external exam visualizing the outer anus. However, only 21 (52.5%) of patients had a documented digital rectal exam. Three patients could not tolerate an exam due to pain. CT scans were ordered in 9 (22.5%) patients. Out of the 9 CT scans, 7 did not aid in diagnosis nor change management after physical exam. Of those seven patients, 6 had perirectal abscesses and 1 had a thrombosed external hemorrhoid. The 2 CT scans that were useful include a patient with prostatitis and a patient with a perirectal abscess that did not have any external findings.

Conclusions/Discussion: The current project shows that CT scans are often not necessary in those presenting with rectal pain to the emergency department. A thorough anorectal exam will often provide enough information for diagnosis and management. Limitations to this project include the small sample size and use of rectal pain as the sole chief complaint analyzed. Future research studies must be conducted to include all anorectal diagnoses. Nevertheless, emergency department providers should perform a thorough anorectal exam with appropriate documentation. If there is question about the diagnosis, evaluation by a colorectal specialist should be sought prior to ordering a CT scan.

Table 1. Patient Characteristics (n=40)	
Age, years - mean (SD)	39 (13.9)
BMI, mean (SD)	27 (6.1)
ASA, mean (SD)	2 (0.9)
Gender, n (%)	
Male	24 (60.0)
Female	16 (40.0)
Race, n (%)	
African American	27 (67.5)
Caucasian	13 (32.5)
Physical Examination Conducted, n (%)	
External Examination	40 (100.0)
Internal Examination	21 (52.5)
CT Performed, n (%)	9 (22.5)
Discharge Diagnosis, n (%)	
Hemorrhoid	23 (57.5)
Abscess	12 (30.0)
Fissure	3 (7.5)
Prostatitis	1 (2.5)
Rectal Pain, unknown etiology	1 (2.5)

OFFICE VISITS PRIOR TO COLONOSCOPY: DOES IS MAKE A DIFFERENT?

P74

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Purpose/Background: In current practice, most patients undergoing colonoscopies do not have office visits prior to undergoing the procedure. Nevertheless, some endoscopists routinely sees their patients in office prior to colonoscopy believing it is better to introduce themselves and educate the patients regarding the procedure outside the endoscopy suite. The utility of these visits is called into question because these visits not only add cost for the patient but may also take up a significant portion of clinic time given how many colonoscopies are performed each year. Therefore, the purpose of this study is to compare patient satisfaction with colonoscopy between those that did and did not have pre-procedure visits.

Methods/Interventions: Surveys were given to patients who were > 18 years old and who underwent colonoscopy by one of four Ohio Heath colorectal surgeons during September 2018. Data collected included age, reason for colonoscopy, if this was patient's first colonoscopy, satisfaction with colonoscopy procedure on a scale of 1 to 10, patient reported preparedness for the procedure, and if patients who did not have an office visit would have liked one.

Results/Outcome(s): Surveys were obtained from 61 patients with a mean age of 59.9 years old. 13 patients had pre-procedure office visits and 48 patients did not have a pre-procedure office visit. Most patients had the colonoscopy for screening purposes 65.6%. This was the first colonoscopy for 20 patients (33%). Satisfaction was high for all patients (mean 9.9, SD 0.39) with no statistical difference ($p=0.2983$) in satisfaction between patients that had a pre-procedure visit (mean 9.8, SD 0.44) and patients that did not have a pre-procedure visit (mean 9.9, SD 0.40). There was no statistically significant difference in satisfaction between those who had their first colonoscopy versus those that had prior colonoscopies ($p=0.6030$). There was no statistical difference in feeling prepared for the colonoscopy between patients that had prior colonoscopy and those that did not. Among those that did not have an office visit, two patients (4.2%) wished they had a pre-procedure office visit. Only one patient that did not have an office visit felt unprepared.

Conclusions/Discussion: Based on these results, having a pre-procedure office visit did not make a difference in terms of patient satisfaction or feelings of preparedness. Limitations to this study include a small same size. Larger studies must be conducted in order to affirm these results. Nevertheless, pre-colonoscopy visits may not be necessary, which may save on patient expenses as well as free up clinic time for the endoscopists.

Table 1. Patient Characteristics and Satisfaction			
	Overall (n=61)	Pre-Procedure Visit (n=13)	No Pre-Procedure Visit (n=48)
Age, years - mean (SD)	59.5 (9.8)	52.6 (8.87)	61.5 (9.27) [‡]
Reason for screening, n (%)			
Screening	40 (65.6)	8 (61.5)	32 (66.7)
Surveillance	17 (27.9)	3 (23.1)	14 (29.2)
Bleeding	1 (1.6)	1 (7.7)	0 (0.0)
Other	3 (4.9)	1 (7.7)	2 (4.2)
Surgeon, n (%)			
1	30 (49.2)	4 (30.8)	26 (54.2)
2	8 (13.1)	3 (23.1)	5 (10.4)
3	18 (29.5)	4 (30.8)	14 (29.2)
4	5 (8.2)	2 (15.4)	3 (6.3)
First colonoscopy, n (%)			
Yes	21 (34.4)	5 (38.5)	16 (33.3)
No	40 (65.6)	8 (61.5)	32 (66.7)
Prepared, n (%)			
Yes	60 (98.4)	13 (100.0)	47 (97.9)
No	1 (1.6)	0 (0.0)	1 (2.0)
Satisfaction – mean (SD) [§]	9.9 (0.39)	9.8 (0.44)	9.9 (0.40)

[‡] Age was not available for two participants

[§] Patients were asked to indicate their satisfaction with the procedure on a scale of 1 (not satisfied) to 10 (very satisfied). There was no difference in satisfaction between patients that did and did not have a pre-procedure visit; $t(59)=1.0493$, $p=0.2983$ using two-tailed t-test.

OUTCOMES OF SINGLE INCISION LAPAROSCOPIC SURGERY (SILS) IN COLORECTAL SURGERY: A SINGLE CENTRE EXPERIENCE.

P75

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Purpose/Background: Single Incision Laparoscopic Surgery (SILS) is an emerging technique that minimises the relative of invasiveness of conventional laparoscopic surgery. The method is gaining increasing attention due to its potential to reduce post-operative complications, diminish post-operative pain and improve aesthetic outcome. The current literature contains limited reports on the use of SILS technique particularly in colorectal procedures. Intra-operative and post-operative outcomes of SILS still remain poorly established. In this study, we present a single centre case series of colorectal resections conducted using the SILS technique.

Methods/Interventions: Fifteen patients in total underwent single-incision laparoscopic colorectal procedures at our unit between September 2017 and October 2018. All procedures were performed by two surgeons and the operative technique was standardized between the two operators. All patients followed the same post-operative treatment protocol. Patient demographic and clinical data were collected and analysed retrospectively from medical records and theatre databases. Primary outcomes measured included operative time, conversion to open and immediate post-operative complications. Secondary outcomes were length of hospital stay and wound complications.

Results/Outcome(s): Of the 15 patients included in the study, 9 were male and 6 were female. The median

age at time of surgery was 66 (range 26-85). Patients had a median BMI of 33 (range 19-39). The majority were ASA II. Seven SILS right colectomy procedures were performed for right colonic malignancy, 5 were performed for Crohn's disease and 3 were for reversal of Hartmann's procedure. Every operation was successfully completed without need for conversion or additional trocar insertion. All patients achieved clear resection margins (r0). The median operating time was 93 (range 85-116) minutes for right colonic malignancy patients. The median post-operative length of hospital stay was 7 (range 3-30) days. The median operating time for a SILS right colectomy to treat Crohn's disease was 106 (range 68-153) minutes, and the median post-operative length of hospital stay was 4 (range 4-7) days. In SILS reversal of Hartmann's procedure, operating times ranged from 115 to 165 minutes, and the median post-operative length of hospital stay was 5 days (range 3 - 10). Overall, 1 of 15 (6.6%) patients developed anastomotic leak following SILS right colectomy for a hepatic flexure cancer. This was successfully managed conservatively with a percutaneous drain. The remaining 14 patients did not develop any major post-operative complications during the median follow-up period of 3 months. Two patients reported minor peri-umbilical wound dehiscence related to superficial sepsis. There were no mortalities.

Conclusions/Discussion: SILS colorectal procedures are technically feasible and safe when performed by experienced laparoscopic surgeons and theatre teams.

COLORECTAL CANCER REGISTRIES: COMPARING THE UNITED KINGDOM AND UNITED STATES OF AMERICA AND THE CALL FOR INTERNATIONAL STANDARDIZATION.

P76

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Purpose/Background: Colorectal cancer registries and databases are invaluable tools in assessing quality of care and the pattern of resource allocation in the management of colorectal cancer. Significant variations exist between different registries, which make meaningful comparisons challenging. This study aims to highlight the key differences between the two largest registries, the National Bowel Cancer Audit (NBOCA) in the United Kingdom (UK), and the National Cancer Database (NCDB) in the United States (US).

Methods/Interventions: Database variables, method of data collection, outcome reports, and accessibility for the two cancer registry databases were compared and tabulated by two independent reviewers, allowing for a qualitative comparison between NBOCA and NCDB.

Results/Outcome(s): Important differences exist at every level between the two registries. NBOCA data collection is required from every National Health Service associate

facility and has data available from 2000, while NCDB reflects about 70% of new cancer diagnoses from accredited facilities across the US with data from 2004. NBOCA issues annual national reports, which include figures on 2-year survival rates. In the US the public benchmark reports are available from 2006 to 2015 only and specifically exclude survival rates. These are instead privately sent to individual approved institutions. In both registries, gaining access to raw data for use in clinical research can prove to be exceedingly challenging. In the UK, data entry is performed by clinical staff, whereas in the US, it is assigned to nonclinical administrators. While there are overlaps in specific database variables collected, NBOCA contains specific clinical information, such as height of tumor location for rectal cancers,

and whether the patient was evaluated in a multidisciplinary setting (Table 1). In the US, there is currently no registry dedicated to colorectal cancer. Neither registry presents data on cancer recurrence. In the UK, there is no approved process for obtaining access to data, and in the US, access to NCDB raw data is limited by the restricted dates during which proposals are accepted.

Conclusions/Discussion: The UK and US are considered global leaders in the field of colorectal cancer care; however, the cancer registries that each utilizes are vastly different. The main difference is that the NBOCA has a more tailored approach to reporting colorectal cancers. This variability in data collection is further compounded when taking into consideration other colorectal cancer registries

P76 Table 1: Differences in data requested in NBOCA vs. NCDB. Data entered in each column are the additional information asked in one database and not the other.

	NBOCA	NCDB
Demographic/Patient details	ASA grade BMI	Age at diagnosis Race Spanish/Hispanic origin Address at diagnosis
Tumour/Cancer Identification	Tumour height above anal verge Multi-disciplinary meeting type (MDT) Performance Status CPEX Anaerobic threshold	
Hospital Specific		NPI-reporting facility NPI-Archive FIN Abstracted by Date of 1st contact Class of case Primary payer at diagnosis
Treatment (Surgery/Chemoradiotherapy)	Surgical urgency Surgical Access Immediate postop care Seen by clinical nurse specialist Unplanned return to theatre	Treatment hospital 1st surgical outpatient appointment Charlson-Deyo comorbidity score Surgical margins Surgical Discharge date Transplantation/Endocrine surgery Immunotherapy/BRM/Hormone Radiotherapy dose/volume Reason for no radiotherapy 30-day readmission to hospital
Pathology	Circumferential resection margin status Local invasion for polypoid/sessile tumours Mismatch repair	
Follow-up/Recurrence/death		Date of last contact Recurrence date-1st* Recurrence type-1st* Vital status (alive/dead)

*Indicates variables that are collected, but not available in the NCDB PUF file.

NCDB PUF is de-identified thus reporting facility, abstracters name, and dates are not available (only time from one event to another).

around the world. Adopting a dedicated international colorectal cancer registry with uniform data variables and method of collection is essential. This will establish robust data collection for meaningful research in order to improve outcomes and innovations pertaining to colorectal cancer.

ENHANCED RECOVERY OFFERS FEASIBLE VALUE IN RURAL COLORECTAL SURGERY.

P77

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Purpose/Background: Comparatively, academic and urban hospitals have implemented Enhanced Recovery After Surgery (ERAS) protocols for colorectal surgery at a greater rate than community or rural hospitals. There are unique challenges to ERAS feasibility in rural practice including patient factors, high staff turnover, fewer resources, and lower case volume. The Bassett Healthcare Network is a rural, regional health care system serving central New York State which is comprised of an advanced-care teaching hospital, four affiliate hospitals, and more than two dozen community-based clinics. Based on urban/rural designations defined by the U.S. Census, the counties served by the Bassett Healthcare Network are, on average, 98.6% rural. The median annual household income was \$53,079, with 11.3% of families living below poverty in the region. One-third of adults older than 25 had attained an associate's degree or higher.

Methods/Interventions: We drew data from elective bowel resection cases 2 years prior (n=214) and 3 years after (n=224) implementing an ERAS protocol at a small, rural health network in upstate New York. The implementation

required changes in staff workflow, protocolized order set design, buy-in at multiple levels of perioperative care, at least 53 separate meetings of multidisciplinary teams.

Results/Outcome(s): Median LOS decreased from 6.9 to 5.1 days. Mean surgical time decreased from 4.1 to 3.9 hours. 30-day readmission rate decreased from 16.6% to 15.7%. While the rate of any complication increased from 29.4% to 34.8%, the rate of serious complications such as death, anastomotic leak, and deep wound infection remained unchanged. Cost was estimated per patient to have decreased by \$3,000. Despite patients traveling large distances for surgery (mean=33.1 miles), providers and educators were able to meet at regional clinics in "hub and spoke" model, reducing barriers to adherence. Despite workforce shortages and high staff turnover, the hospital was able to protocolize enhanced recovery and perpetuate a positive, evidence-based workplace.

Conclusions/Discussion: For colorectal surgery in a rural setting, it is valuable to implement an Enhanced Recovery protocol to improve hospital length of stay, readmission rate, surgical time, and overall cost.

OPIOID PRESCRIBING PATTERNS AND PATIENT USE AT DISCHARGE AFTER COLORECTAL SURGERY.

P78

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Purpose/Background: The opioid epidemic in the United States remains a serious public health concern. Surgeons prescribing opioids for post-operative pain contribute to the amount of opioids circulating within

P77 Rural ERAS --- "Why it Works"

Rural-Specific Barrier	Implementation	Sustainable Endpoint
Patients travel distance to hospital	Build "hub and spoke" model hospital network	Providers meet patients closer to home
Poor health literacy	Design communicable pre/post-operative counseling	Trusted relationships develop during frequent appointments
High percent Medicare and Medicaid patients and lower reimbursement	Implement accelerated post-operative track with safe discharge	Cost-containment through decreased LOS and readmission
Relatively low-volume surgical practice	Preference evidence-based techniques such as laparoscopy	Improved surgical outcomes
Workforce shortages	Streamline processes, reduce total patient-days on wards	Measurable and achievable roles for staff
Higher staff turnover	Train all hires according to evidence-based goal	Cultures is perpetuated
Few financial resources for equipment and medication	Prioritize stock of ERAS components and justify to payers and administrators	Improved recovery, reduced opioid use

communities. Recent studies have demonstrated variability in prescribing habits between surgical specialties, and that patients typically use much less opioid than they are prescribed. Our aims were to (1) describe current opioid prescribing practices at discharge and patient use thereafter for specific colorectal procedures, and (2) to evaluate variation in prescribing practices and patient use based on the indication for surgery.

Methods/Interventions: We conducted a single institution study at a rural academic center, examining data for patients who underwent colorectal surgery (open colectomy, laparoscopic colectomy, ileocolic resection, and low anterior resection with diverting ileostomy) from September 2017 to November 2018. We reviewed medical records and collected prospective data from patient telephone questionnaires administered approximately one week after discharge. These questionnaires inquired about opioid use, including the number of pills used from the discharge prescription. Telephone follow-up was employed for patients still actively using an opioid at the time of the initial telephone questionnaire. Whenever possible, patient reports of opioid prescription amounts were confirmed by chart review. Primary outcomes were the quantity of opioid prescribed and used, expressed as morphine milligram equivalents (MME). We compared these quantities between surgical procedures and according to broadly categorized indications for surgery (malignant disease, benign inflammatory disease, and benign non-inflammatory disease).

Results/Outcome(s): We identified 86 patients who underwent colorectal surgery during the study period and who completed the post-discharge opioid telephone questionnaire. Of these, 83% had their surgery performed by the colorectal service, and 17% by the acute care surgery service; 90% were elective cases and 10% were emergent or urgent. Fifty-seven percent underwent a laparoscopic procedure and 43% had an open procedure. The number of opioid pills prescribed ranged from 0 to 70 tablets, and the distribution of MME prescribed by procedure is displayed in Figure 1. Of the 86 patients in our study, 65 patients received an opioid prescription. The mode for the number of pills prescribed was 10. Length of stay was generally shorter after laparoscopic colectomy (median=3 days) than after open colectomy (median=5 days). Among all patients surveyed, 13% used all of the opioid prescribed at discharge and 6% required a refill for pain medication. These proportions did not differ significantly across colorectal procedures. The median percentage of pills used by procedure was 50% for laparoscopic colectomy, 45% for open colectomy, 59% for ileocolic resection, and 44% for low anterior resection with diverting ileostomy. We found no difference in the MME filled and the percentage of pills used based on the indication for surgery. The benign non-inflammatory disease group required more refills of opioid prescription than the malignant or benign inflammatory disease groups ($p=0.04$). There was no statistical difference in the quantity of opioids prescribed,

the amount of opioid used, or need for refills based on the type of procedure, urgency, surgical service, or surgical approach (laparoscopic vs. open).

Conclusions/Discussion: There was wide range of MME prescribed at discharge, however the typical number of tablets prescribed was consistent across procedure. The majority of patients did not use all of the opioids prescribed and few needed refills, suggesting that surgeons may be able to prescribe less opioid at discharge without patient detriment. The lack of difference in prescribing based on open vs. laparoscopic procedure may be explained by the longer lengths of stay noted among open colectomy patients. There was no significant difference in prescribing habits based on type of procedure, urgency, or approach. However, our study sample is small, and further data regarding prescribing habits and use of opioids among colorectal surgery patients will need to be collected.

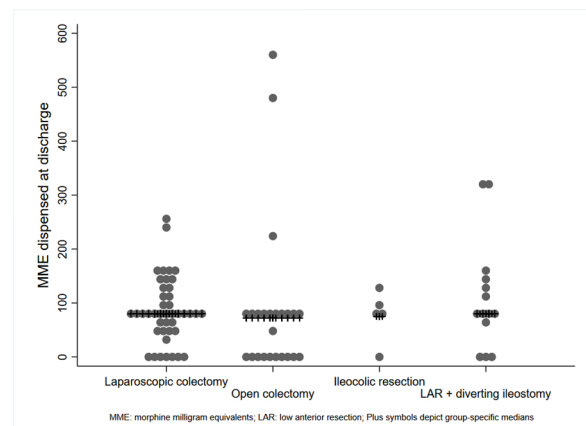


Figure 1: Distribution of Morphine Milligram Equivalents (MME) prescribed at discharge by colorectal procedure

WHAT REALLY INFLUENCES THE DECISION FOR RESECTION IN COLON CANCER PATIENTS? MEDICAL FACTOR VS. NON-MEDICAL FACTORS.

P79

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Purpose/Background: Previous studies have suggested that poor survival among colon cancer cases is associated with race, low socioeconomic status (SES), and insurance type. Whether or not these non-medical patient factors also influence the type of treatment a patient receives during a hospital stay has not been examined in a single study together with medical factors. Colon cancer has a relatively well-defined set of guidelines to determine the need for surgical intervention. In this study, we examine a set of medical and non-medical patient factors to see their effect on colon resection for patients with colon cancer.

Methods/Interventions: We used the 2008-2016 National Inpatient Sample (NIS) database for this study.

We identified colon cancer patients with ICD-9-CM (2008-2015Q3) and ICD-10-CM (2015Q4-2016) diagnosis codes. The patients were separated based on whether or not they have received a colon resection. Univariate analysis was performed for 5 non-medical patient factors (age, sex, race, insurance, and income quartile) and 10 medical patient factors (smoking, COPD, diabetes, CKD, hypertension, hypertension with CKD, metastatic cancer, immunosuppression, colon perforation, and colon obstruction). Both medical and non-medical factors (except for immunosuppression) were fitted into a logistic regression model to predict the adjusted odds ratio (aOR) for colon resection.

Results/Outcome(s): From the NIS database, we identified 317,524 patients diagnosed with colon cancer. There were 96,526 (30%) colon cancer patients that had a colon resection performed during their hospital admission. All the patient factors analyzed in the univariate analysis showed a significant difference between the treatment compared to the non-treatment group except for immunosuppression. Fitting the remaining 14 patient factors into a logistic regression model, all factors except for COPD had a significant impact on the odds of colon resection (Figure 1). Of note, the two factors that greatly increased the odds of colon resection were colon perforation (aOR=5.08, $p<0.001$) and colon obstruction (aOR=2.08, $p<0.001$), and the two factors that greatly reduced the odds of colon resection were CKD (aOR=0.59, $p<0.001$) and metastatic cancer (aOR=0.50, $p<0.001$). Although the non-medical factors did have a statistically significant impact on the odds of colon resection, the effect size on the odds was smaller relative to medical factors. The largest effect on odds was observed for Medicaid insurance patients that had almost a 25% decrease in odds of receiving a colon resection (aOR=0.76, $p<0.001$) compared to Medicare insurance patients. Black, Hispanic, Asian or Pacific Island and Other races all had significantly 10%-20% decrease of odds of receiving a colon resection. An inverse relationship between income quartile and odds of receiving a colon resection was observed. Given the recent expansion of Medicaid coverage in many states, we also looked for a trend in treatment for Medicaid patients, but failed to find an increased trend in treatment for these patients.

Conclusions/Discussion: By combining both medical and non-medical factors into a single analysis, we were able to obtain a direct comparison to evaluate the relative impact of non-medical factors on patient receiving surgical treatment for colon cancer. Non-medical factors such race and income quartiles were statistically significant in influencing the rate of colon resection for colon cancer patients, although we found that medical factors had a larger impact. It was surprising to see from this data how little impact the recent changes in public policy and Medicaid expansion had on the rate of colon resection as a whole, despite having a relatively well-defined set of surgical treatment guidelines for colon cancer.

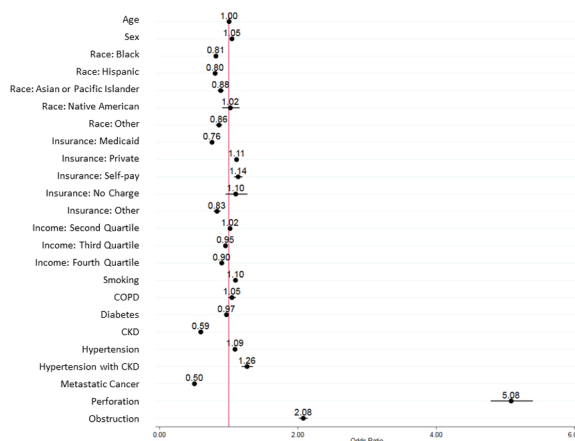


Figure 1. Adjusted odds ratios for non-medical and medical factor on colon resection for colon cancer patients as predicted by logistic regression. Referent group for race is white, insurance is Medicare, and income is first quartile.

OUTCOMES FOLLOWING SELECTED SPLENIC FLEXURE MOBILIZATION IN THE ROBOTIC ERA.

P80

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Purpose/Background: No clear recommendations for routine versus selective splenic flexure mobilization (SFM) have been delineated in left colon surgery and its variants. Arguments in support of routine SFM suggest that it is absolutely necessary for optimal oncologic resections and to decrease incidence of anastomotic leak. Other literature attest no change in postoperative morbidity (including anastomotic leak rate), oncologic outcomes, or overall survival after SFM. The introduction of robotic surgery in colon and rectal procedures helped overcome some limitations of conventional laparoscopy, and continues to evolve. Unfortunately, literature regarding outcomes after SFM following the introduction of robotic colon and rectal surgery are lacking. Given the conflicting literature regarding routine versus selective SFM, we reviewed elective left colon and rectal cases over five years from our community hospital to evaluate rates of SFM and compare outcomes across surgical approaches.

Methods/Interventions: We conducted a retrospective analysis of adult subjects undergoing elective colon and rectal surgery which may necessitate SFM during a five-year period from January 1, 2013 to December 31, 2017. Data collected included patient demographics, in particular risk factors for anastomotic leak. Subjects were identified by CPT codes for sigmoid colectomy, left colectomy, and low anterior resection (LAR). Exclusion criteria included emergency surgery, unplanned conversion to open surgery, and locally advanced disease with invasion into adjacent organs. These criteria were applied in an attempt to eliminate patients with increased risk of

morbidity, including anastomotic leak. Data were collected from electronic medical records, and then descriptive statistics were calculated. Associations between categorical variables were made with the chi-square test. Differences between groups on continuous variables were examined using the Student t-test. P-values <0.05 were considered statistically significant. Analyses were conducted using SPSS version 22 software.

Results/Outcome(s): There were 164 left colon and rectal cases during the time period of interest. After application of exclusion criteria, the total sample size was 103 subjects, of which SFM was performed in 45.6% of cases (n=47). The average age was 63 years old, and 41.7% of the cases were robotic (n=43), 35.9% open (n=37), and 22.3% laparoscopic (n=23). There was an increased rate of SFM in patients with preoperative neoadjuvant therapy (p=0.03). Otherwise, there were no statistically significant difference in rates of SFM by age (p=0.86), sex (p=1), race (p=0.81), obesity (p=0.83), tobacco use (p=0.43), immunosuppression (p=0.28), or history of CAD (p=0.30). We assessed the rate of SFM by surgical approach and found no difference (open 51.4%, laparoscopic 40.0%, robotic 46.5%, p=0.68). There was also no difference in rate of SFM by surgical indication (cancer 41.5%, diverticular 50%, other 41.7%, p = 0.69). We next assessed differences in outcomes with and without SFM. There was no statistical difference in operative time with (average 210 minutes) or without SFM (average 187 minutes without SFM, p=0.22). Complications were minimal and are as listed: return to operating room (OR) 6.8% (n=7), abscess 7.8% (n=8), anastomotic leak 2.9% (n=3), ureteral injury 1.9% (n=2), bleeding 3.9% (n=4). Analysis demonstrated no association between SFM and rates of abscess, anastomotic leak, or bleeding requiring transfusion. Adverse events were too infrequent to compare between modalities, though there was no difference in readmission rates between the three modalities (total sample size 18.1% (n=19), open 13.5%, laparoscopic 16%, robotic 23.3%, p=0.5). No 30-day or in hospital mortality was reported in this population during the time frame.

Conclusions/Discussion: Our results demonstrate no significant difference in rates of SFM by patient factors, surgical approach, or indication for surgery. There was also no increase in operative time or incidence of perioperative complications (including anastomotic leak) with SFM. Though limited by small sample size, the data gathered from this busy community teaching hospital help confirm that selective SFM is safe across a variety of surgical approaches in the community hospital setting, and that its inclusion is based on clinical acumen rather than surgical dogma. This represents one of the first studies comparing outcomes following SFM across several surgical modalities, including robotic surgery, as well as indications for surgery, including cancer and diverticulitis. An existing pool of literature shows SFM to be a technically challenging component of surgery that increases not only operative

time, but also blood loss and intraoperative complications. However, our experience reveals that selective inclusion of SFM is a safe and valuable technique that surgeons may adapt to various procedures.

ORGAN PRESERVATION IN RECTAL CANCER: BONUS OR ULTIMATE GOAL?

P81

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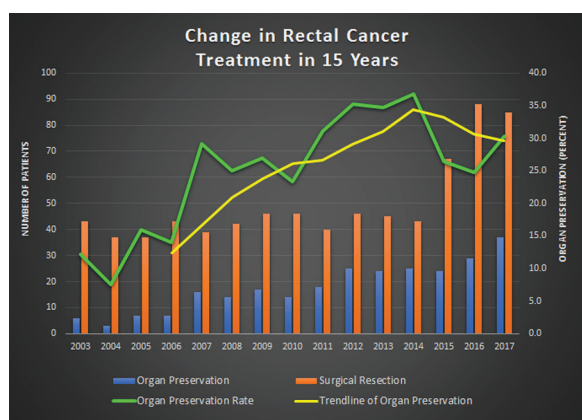
Purpose/Background: Rectal cancer surgery has undergone a dramatic change in the last century. It started with abdominoperineal resection, but today neo-adjuvant therapies, minimally invasive surgery and sphincter-sparing techniques have become standard for suitable patients. Organ preservation with local excision and/or non-operative management has emerged as a new goal on the horizon.

Methods/Interventions: This is a single institution retrospective study demonstrating the change in organ preservation rates in rectal cancer in the last 15 years. Rectal cancer patients with resectable disease who were treated between 2003-2017 were included in the study. Exclusion criteria were histology other than adenocarcinoma or neuroendocrine tumor, inoperable disease either due to metastatic burden and/or local invasion, treatment refusal and performance status that prevented any treatment. The main outcome measure was rate of organ preservation. Chi-square test and linear regression models were used to determine the relationship between age, gender, histology, T stage and overall stage on organ preservation.

Results/Outcome(s): A total of 1,198 patients presented to Florida Hospital with rectal cancer between 2003-2017. Of these, 145 patients were inoperable due to metastatic/locally advanced disease, 21 patients refused treatment and 22 patients were physically unfit for treatment. The remaining 1010 patients were included in the analysis (median age 64 years, 60.2% male). Overall organ preservation rate was 26.2%. These included patients who were treated either with local excision (n=244) or who had a complete clinical response to neo-adjuvant therapy (n=21). The rate of organ preservation shows an increase from about 10% to 30% over a period of 15 years. Patients who underwent surgical resection were younger (62.4 ± 12 vs 65.6 ± 15 , p=0.001). Males were more likely to undergo surgical resection than females (76% vs. 70.4%, p=.049). Neuroendocrine tumors were more commonly treated by local excision compared to adenocarcinoma (76.1% vs. 23.9, p<.001). Multivariate regression analysis identified T-stage as the most significant predictor for choice of treatment modality in patients with adenocarcinoma. Higher T-stage was associated with higher probability for surgical resection (T1: 32.3%, T2: 78.8%, T3: 90.5%, T4: 100%, p<.001). During a median follow-up of 38 months,

recurrence rates were 6.2% in organ preservation group and 20.9% in surgical resection group ($p < .001$).

Conclusions/Discussion: Rectal cancer treatment is undergoing a rapid change with the introduction of new treatment modalities into the armamentarium. Less invasive techniques are being utilized to preserve functional and anatomical integrity. Today, thirty percent of patients are able to preserve their rectum, which represents a big contrast to the inevitable abdominoperineal resection at the turn of the twentieth century. Patients with early stage tumors are more likely to avoid surgical resection and its consequences, namely low anterior resection syndrome. This highlights the importance of screening programs in order to diagnose patients at early stages and provide better quality of life at the end of the treatment.



ASSESSMENT OF LEARNING CURVE OF TATME BY MULTIDIMENSIONAL CUSUM ANALYSIS.

P82

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Purpose/Background: Transanal total mesorectal excision (taTME) is a minimally invasive procedure introduced to optimize the quality of TME for patients with mid and low rectal cancer. Evidence has shown that taTME is associated with promising clinical and short-term oncological outcomes. However, this complex procedure is still in the early phase, with a potentially steep learning curve. The objective of this study was to review a single surgeon's experience with taTME since its adoption in our institution. Using cumulative sum (CUSUM) analysis, we aimed to assess its learning curve based on both operative and pathological endpoints.

Methods/Interventions: Eighty-one consecutive patients who underwent two team taTME for primary rectal cancer, between October 2013 and July 2018 were prospectively evaluated for surgical and pathological outcomes. The abdominal portion was performed with another colorectal surgeon from the same institution, using a laparoscopic or hand-assisted approach. The pathological outcome included

the quality (graded on 3 levels: 'complete', 'near complete' and 'incomplete') and the circumferential and distal resection margins of the mesorectal specimen. For the purpose of learning curve assessment, we evaluated all patients with two main operative and one pathological endpoint. Operative end points are based on proximal extent of taTME dissection in relation to an anterior (dissection extends beyond anterior peritoneal reflection) and a posterior (dissection extends beyond low pelvis) anatomical landmark. The pathological endpoint was a 'near-complete' or better mesorectal quality. Successful taTME was defined as achievement of all 3 endpoints and failure as inability to achieve >1 endpoints. CUSUM analysis for 'taTME failure' was performed for learning curve assessment. Clinical and pathological outcomes were compared among the different phases within the learning curve.

Results/Outcome(s): 81 patients [56 males (69.1%); mean age 58.2 ± 12.9 years] were included for analysis. The majority were overweight or obese (73% with $BMI > 25 \text{ kg/m}^2$), had low/mid rectal adenocarcinoma (median distance from anal verge = 5.5cm) and had undergone neoadjuvant chemoradiation (65 patients, 80%). Overall, the mean total operative time was 363 ± 69.5 minutes and the taTME-related conversion rate 2.4%. All but 3 patients (96.3%) had restorative procedures, the majority with handsewn anastomosis (63%). Median estimated blood loss was 150cc and only one intraoperative complication directly related to perineal dissection was reported (urethral injury). Median length of hospital stay was 5 (range 3-30) days; no anastomotic leaks were noted. Multidimensional CUSUM analysis based on the defined criteria for 'TaTME failure' (Fig. 1d) showed two peak points at the 17th and 44th cases. From the cut off points, 3 phases were identified: 1st: 'learning phase' (patients 1-17); 2nd: 'consolidative phase' (patients 18-44); and 3rd: 'mastery phase' (patients 45-82). There was no difference in baseline characteristics except for tumor distance (5cm in 1st and 2nd phases vs. 6cm in 3rd phase) across the 3 phases. Mean operative time showed reducing trend, but was not significant. However, the rate of proximal extent of the anterior dissection was higher during 3rd phase (94.6%, vs 43.8% and 85.2% in 1st and 2nd phases, respectively; $p < 0.001$). For pathological endpoint, the rate of 'incomplete' mesorectal quality was 5.4% in 3rd phase, significantly lower than 41.2% and 22.2% in 1st and 2nd phases ($p = 0.007$). Regarding perioperative complications, pelvic abscess was noted to be more common during 1st phase compared to the 2 other phases ($p = 0.023$). Overall, no patient had positive distal margin, but 2 (2.5%) in the 2nd phase had circumferential resection margin involvement ($p = 0.150$).

Conclusions/Discussion: By combining both the proximal extent of anterior/posterior dissection as operative endpoints and mesorectal quality as the pathological endpoint, CUSUM analysis showed 3 distinct phases of learning curve in taTME. This analysis revealed that it took 17 cases to complete the initial learning curve before the surgeon consolidated the skills towards the mastery

phase, which occurred after 45 cases when a significantly improved pathological outcome was obtained. The results suggest that taTME mastery requires access to a high volume of patients with rectal cancer.

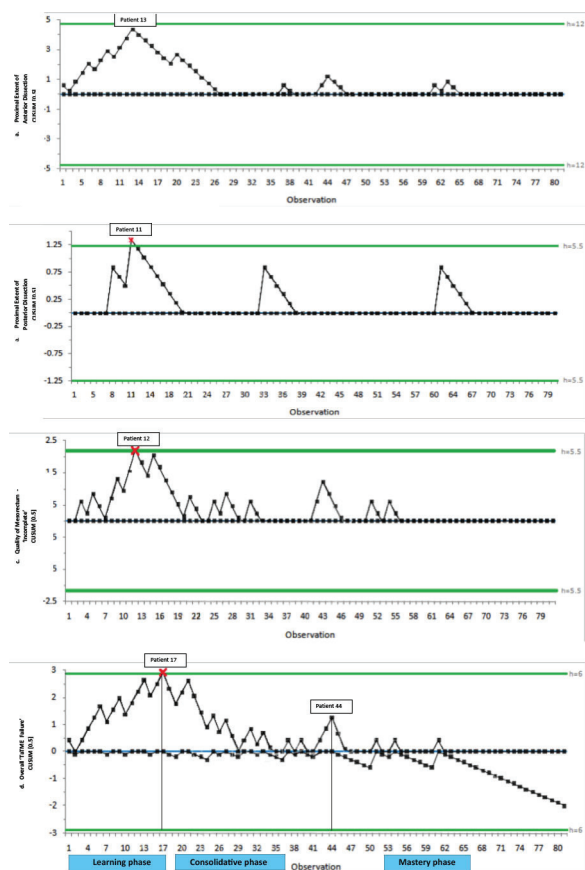


Figure 1. Cumulative Sum (CUSUM) chart analysis for TaTME learning analysis based on different end points. (a) CUSUM based on operative endpoint – ‘proximal extent of anterior dissection’. Curve moves upward when case failed to pass the anterior dissection target which was anterior peritoneal reflection; moves downward when the target was reached. (b) CUSUM based on another operative endpoint – ‘proximal extent of posterior dissection’. Curve moves upward if failed to reach posterior target - low pelvis. (c) CUSUM based on ‘incomplete mesorectum quality’. Curve moves upward when mesorectum quality was ‘incomplete’, downward for otherwise. (d) CUSUM for overall ‘TaTME failure’ as defined. Curve moves upward for ‘TaTME failure’ and downward for otherwise.

COLORECTAL SQUAMOUS CELL CARCINOMA: A POPULATION-BASED STUDY OF RARE TUMOR TYPE.

P83

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Purpose/Background: Primary Colorectal squamous cell carcinoma (CRSCC) is a rare malignancy accounting for approximately 0.25% of all colorectal cancers. CRSSC was first reported in the published German literature in 1919; however, the risk factors and the natural history of this disease are not well understood given its relative

rarity, with less than 100 cases having been reported in the published literature. The aim of this study was to describe the characteristics of this rare disease using a population based tumour registry.

Methods/Interventions: The Surveillance, Epidemiology, and End Results (SEER) database was queried between 1998-2012 and all cases of CRSCC were identified. Each case record extracted from the SEER registry included: age; gender; year of surgery; tumour size, tumour grade; TNM stage; number of positive LNs retrieved; total LN count; radiotherapy status (yes/no); censored follow up (yes/no); and, cancer specific survival in months. Case records were removed that did not include all extracted variables or that related to anal squamous cell carcinoma. Univariate and multivariate analyses were performed to examine the effects of age, location, surgical intervention and lymph node yield upon cancer specific survival.

Results/Outcome(s): A total of 464 patients were identified with CRSCC of which 50 patients (10.8%) had colonic SCC. The mean age of the cohort as a whole was 60.7 +/- 13.7 (standard deviation [SD]) years, 165 (35.6%) of the patients in the cohort were male. Tumours were well differentiated in 38 (8.2%), moderately differentiated in 157 (33.8%), poorly differentiated in 179 (38.6%) and anaplastic in 8 (1.7%) cases. There was no documented grade for the remaining 82 (17.7%) cases. When colorectal TNM staging was used two hundred and fifty-nine (55.8%) patients had AJCC stage 1 cancers, 72 (15.5%) had stage 2, 66 (14.2%) patients had stage 3, with the remaining 67 (14.4%) patients having stage 4 disease. Average tumour size was 48.3 +/- 25.7 (SD) mm. One hundred and twelve (24.1%) patients did not undergo radiotherapy while a total of 340 (73.3%) patients underwent radiotherapy. The remaining 12 (2.6%) patients did not have a radiotherapy status recorded. A total of 23 (5.0%) patients did not undergo surgery while 148 patients did have an operation (31.9%). For 100 (53.4%) patients the SEER database did not record if surgery had occurred. An average of 4.3 +/- 14 (SD) lymph nodes harvested were harvested at the time of surgery of which 4.1 +/- 3.6 were involved by tumour. One hundred and twenty five (27.5%) patients died during the study follow up with a median survival of 56.0 +/- 60.3 (SD) months. The Kaplan-Meier survival curves in *Figure 1a* demonstrate rectal CRSCC seems to be associated with a better survival than colonic CRSCC ($p < 0.0001$). CRSCC survival was initially stratified using conventional colorectal adenocarcinoma TNM staging; however, it was noted that this classification does not adequately discriminate between survival for stage 2 / stage 3 cases ($p = 0.2863$; *Figure 1b*). Therefore, the cohort was reclassified using the anal squamous cell TNM staging, where T stage is determined by tumour size, which resulted in good discrimination between each of the survival curves with no overlap of data points or standard error of the mean for each stage group (*Figure 1c*; $p < 0.0001$). A multivariate model was constructed to assess factors influencing cancer

specific survival for patients with CRSCC, which was established utilising an iterative approach. Cancer specific survival was associated with: age ($p < 0.0001$), location ($p < 0.0001$; Figure 1a), surgical intervention ($p = 0.0001$) and a non-significant trend toward increasing lymph node yields from surgery.

Conclusions/Discussion: This study is the first to describe the characteristics of CRSCC using a population based tumour registry. Survival was associated with age, location of the tumour, surgery and nodal harvest. Conventional colorectal adenocarcinoma TNM criteria were demonstrated to inadequately distinguish between stage 2 and stage 3 cohorts in contrast to anal squamous cell carcinoma TNM criteria. This indicates that anal cancer TNM staging should be used clinically for all CRSCC in future.

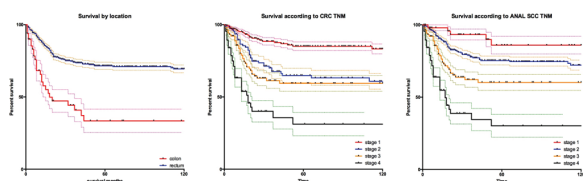


Figure 1 - a.) cancer specific survival of rectal and colonic CRSCC; b.) CRSCC stratified using conventional colorectal adenocarcinoma TNM criteria, with poor discrimination between stage 2 & stage 3 disease; c.) CRSCC stratified using anal adenocarcinoma TNM criteria with clear divergence between survival curves for each stage

CD4/CD8 RATIO AS A NOVEL MARKER FOR INCREASED RISK OF HIGH-GRADE ANAL DYSPLASIA AND ANAL CANCER IN HIV+ PATIENTS.

P84

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Purpose/Background: HIV positive patients are known to be at risk for anal dysplasia and anal cancer. Most experts recommend screening all HIV positive patients for anal dysplasia and surveillance examinations once dysplasia diagnosis established. Surveillance intervals, however, are not well defined and can be a significant burden on patient quality of life, with the most aggressive protocols surveying patients every 3 months. Data are lacking on objective markers of increased risk for progression to advanced disease. Increased risk identifiers have potential to tailor screening and surveillance intervals for high and low risk individuals. Low CD4/CD8 ratio has been associated with increased overall cancer risk in HIV positive patients but has not been examined for anal dysplasia or anal cancer risk specifically. We hypothesize that low CD4/CD8 ratio would correlate with high grade anal dysplasia and cancer.

Methods/Interventions: Patients with HIV were identified via ICD-9/10 diagnostic codes from a single institution.

Within the cohort of HIV positive patients, we identified those who had a diagnosis of anal cancer or high-grade anal dysplasia using ICD-9/10 codes and subsequent chart review. We defined advanced disease as those with high-grade dysplasia or invasive cancer. We additionally identified a cohort of HIV+ patients who underwent screening with anal cytology with negative results. These results were obtained via pathology records. We excluded patients for which we did not have immunologic panels recorded. We identified lowest (nadir) CD4/CD8 ratio prior to diagnosis of advanced disease or screening and CD4/CD8 ratio immediately prior to diagnosis or screening. Mean CD4/CD8 ratios were determined for patients with advanced disease and those with negative screening and compared. Logistic regression modeling was utilized to obtain odds ratios for developing cancer or high-grade dysplasia.

Results/Outcome(s): A total of 400 HIV positive patients were examined. 334 were screened with negative cytology. 11 had a diagnosis of anal cancer and 55 had a diagnosis of high-grade anal dysplasia. When comparing non-cancer patients to those who developed cancer, the mean nadir ratio was 0.45 v. 0.18 ($p = 0.023$). When comparing mean ratio closest to screening or diagnosis the non-cancer patients had an average ratio of 0.82 v. 0.37 ($p = 0.002$). A similar trend was noted when comparing those with negative screening to those with advanced disease (high-grade anal dysplasia or cancer) with mean nadir ratio 0.48 v. 0.25 ($p < 0.001$) and mean ratio prior to screening 0.85 v. 0.59 ($p < 0.001$). Using an unadjusted logistic regression analysis, an increase in the nadir ratio of one unit confers protective effect for cancer risk (OR of 0.016 (95% CI 0.0004, 0.62, $p = 0.026$)) and risk of advanced disease (OR 0.09 (95% CI 0.030, 0.29, $p < 0.001$)). Similarly, an increase in the ratio closest to diagnosis or screening of one unit also confers a protective effect for cancer risk (OR 0.016 (95% CI 0.001, 0.22, $p = 0.002$)) and risk of advanced disease (OR 0.21 (95% CI 0.095, 0.45, $p < 0.001$)).

Conclusions/Discussion: Low CD4/CD8 ratio confers additional risk beyond HIV diagnosis alone of advanced anal dysplasia and anal cancer. While many HIV+ patients will respond to therapy and recover their CD4 cells, recovery of CD4 alone is likely insufficient to significantly lessen their need for anal cancer monitoring, while a higher bar for immune recovery (normalization of the CD4/CD8 ratio) maybe a more reliable marker for less screening need and perhaps even less need for invasive procedures. Natural history data is needed in a modern HIV cohort in which antiviral therapy is started early (new standard of care) and ratio recovery is more common. Whether or not immune recovery changes the natural history of untreated lesions is unclear. Our data suggests that patients with low ratios should be more closely monitored for anal dysplasia and anal cancer while patients with higher ratios may be able to undergo longer intervals between screening or surveillance exams.

CAN THE NORMALIZED CARCINOEMBRYONIC ANTIGEN (CEA) DURING NEOADJUVANT CHEMORADIATION PREDICT TUMOR RECURRENCE AFTER CURATIVE RESECTION IN PATIENTS WITH LOCALLY ADVANCED RECTAL CANCER?

P85

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Purpose/Background: Although recent studies report that reduction of carcinoembryonic antigen (CEA) after neoadjuvant chemoradiation therapy (nCRT) in rectal cancer could be a favorable prognostic factor, conflicting studies report that decreased CEA during nCRT has no significant effect on tumor response and recurrence in rectal cancer. We hypothesized that serum CEA levels may reflect treatment response to nCRT and could be a useful preoperative predictor for recurrence in rectal cancer patients who underwent nCRT followed by curative resection.

Methods/Interventions: After IRB approval, medical records of 192 patients who underwent nCRT followed by curative resection for locally advanced rectal cancer between 2010-2015 were reviewed. Patients who underwent short-course chemoradiation were excluded in this study. Patients were divided into three groups according to serum CEA before and after nCRT: Group A (normal-to-normal): 119 patients with normal CEA before nCRT; Group B (high-to-normal): 37 patients with elevated CEA before nCRT and normal CEA after nCRT; Group C (high-to-high): 36 patients with elevated CEA before nCRT and after nCRT. Cut-off value for normal CEA followed the reference range of each individual laboratory. We compared overall and disease-free survival among the groups and performed univariate and multivariate analyses to identify potential predictors for recurrence.

Results/Outcome(s): 192 patients [median age: 59 (range, 31-87) years; 65.1% male] were identified. 105 (54.7 %) had low rectal cancer, 24 (12.5%) were clinical T4 stage and 135 (70.3%) were clinically node positive. Pathologic complete response was achieved in 42 patients (21.9%). Abdominoperineal resection (APR) was performed in 47 (24.5%), and 135 patients (70.3%) received adjuvant chemotherapy following curative resection. Overall and disease-free survival was 88.0% and 78.1%, respectively. There was no significant difference among the 3 groups in terms of age ($p=0.091$), gender ($p=0.764$), smoking history ($p=0.208$), tumor location ($p=0.669$), clinical T stage ($p=0.122$), clinical N stage ($p=0.902$), or tumor differentiation ($p=0.393$). However, the rate of patients who underwent APR was significantly higher in Group C (38.9 %) than Group A (24.4 %) and Group B (10.8 %) ($p=0.013$). There was no significant difference among the 3 groups in terms of pathologic

N stage ($p=0.984$), number of retrieved lymph nodes ($p=0.741$), lymphovascular invasion ($p=0.056$), or pathologic complete response ($p=0.192$) except pathologic T stage ($p<0.001$), perineural invasion ($p=0.012$), and tumor regression grade ($p=0.024$). Adjuvant chemotherapy was given without any significant difference ($p=0.489$). Surveillance for recurrence was undertaken based on National Comprehensive Cancer Network (NCCN) guidelines in 95.8%, 91.9% and 91.7% of patients in each group ($p=0.508$). Recurrence rates were 16.8%, 24.3%, and 36.1%, respectively ($p=0.045$), involving systemic recurrence in 15.1%, 21.6%, and 25.7%, respectively ($p=0.063$). Overall 5-year survival was significantly higher in Group A than Groups B and C (93.7% vs. 79.5% vs. 67.4%, $p=0.005$), and 5-year disease-free survival was significantly higher in Group A than Groups B and C (82.0% vs. 73.3% vs. 59.8%, $p=0.017$). However, there was no significant difference between Groups B and C in terms of overall survival ($p=0.348$) and disease-free survival ($p=0.208$). In multivariate analysis with preoperative patient characteristics, clinical T4 stage [$p=0.019$, HR (95% CI) = 2.396 (1.155-4.974)] and high-to-high CEA levels [$p=0.034$, HR (95% CI) = 2.071 (1.057-4.058)] were significant risk factors for recurrence. Median follow-up was 46.15 (1.7-99.1) months.

Conclusions/Discussion: Persistent elevated CEA even after nCRT in clinical stage T4 disease was an unfavorable predictor for disease-free survival. However, the decreasing CEA during nCRT may be used as a preoperative prognosticator.

INTERNAL HEMORRHOID HARBORING ADENOCARCINOMA: A CASE REPORT.

P86

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Purpose/Background: Pathologic analysis of a hemorrhoidectomy specimen rarely results in carcinoma. Current literature sites an incidence of 1-2%; however, objective data is lacking. Cataldo and Mackeigan reviewed a data set that revealed only 1 of 21,527 hemorrhoidectomies (0.0046%) contained an unsuspected carcinoma and did not specify whether this particular specimen contained adeno- or squamous cell carcinoma. Neoplasms of the anal canal are most commonly squamous cell carcinoma, followed by cloacogenic (or basaloid or transitional cell) carcinoma and rarely adenocarcinoma. Additionally, adenocarcinoma's of the anal canal are often considered to be the result of the downward extension of a primary tumor of distal rectal origin or from the columnar epithelium in the upper anal canal and, therefore, considered to be of rectal origin and not anal carcinomas. We describe the case of an unsuspecting hemorrhoidectomy specimen that was found to contain adenocarcinoma of the anal canal.

Methods/Interventions: A 79 year-old male with past medical history of atrial fibrillation, diabetes, and remote history of hemorrhoids status post laser ablation presented with rectal bleeding and discovery of large thrombosed internal hemorrhoids during screening colonoscopy. He reported intermittent hematochezia and denied changes in frequency, consistency or caliber of bowel movements, and rectal pain. He is a self-reported never smoker who adheres to a high-fiber diet. Digital rectal examination revealed one small skin tag, but was otherwise unremarkable, and he had no inguinal lymphadenopathy. Anoscopy revealed a single large inflamed and prolapsing internal hemorrhoid. The patient subsequently underwent an uneventful three-column hemorrhoidectomy. The internal hemorrhoids were identified, excised, and sent for routine pathologic evaluation. Pathologic analysis revealed 1 of 3 specimens positive for a 1.5 cm moderate-to-poorly differentiated adenocarcinoma. The tumor showed superficial invasion into the submucosa was appreciated along with a focus that was suspicious for lymphatic invasion. Staging workup revealed normal computed tomography (CT) scans of the chest/abdomen/pelvis, normal CEA level, and unremarkable endoscopic ultrasound (EUS). The case was presented to the institution's interdisciplinary tumor board at which time the recommendation was made to pursue wide local excision of the area. The Patient underwent full-thickness transanal excision with 2 cm lateral margins and extension 4-5 cm into the distal rectum.

Results/Outcome(s): Pathologic analysis of transanal excision specimen revealed chronic inflammation, fibrosis, and foreign body reaction with no residual neoplasm identified. The patient experienced some post-operative bleeding requiring chemical cauterization of granulation tissue, but has otherwise continued along an uncomplicated trajectory of recovery. Close observation and surveillance will be kept, including a flexible sigmoidoscopy and examination under anesthesia including possible biopsies scheduled at 3 months post-transanal excision and full colonoscopy 1 year from diagnosis of adenocarcinoma.

Conclusions/Discussion: The incidence of a hemorrhoidectomy specimen harboring any type of malignancy is exceptionally rare. Adenocarcinoma represents approximately six percent of anal carcinomas overall and is even more rare within a hemorrhoidectomy specimen as one would expect squamous cell carcinoma to occur with higher frequency. It is also possible to have a primary rectal carcinoma within a hemorrhoid specimen likely from downward extension or metastasis. There have been reports of implantation of primary rectal adenocarcinoma on a hemorrhoidectomy specimen and occurrences of metastatic rectal adenocarcinoma found within a hemorrhoid. However, our case is different because we describe a primary anal canal adenocarcinoma within a hemorrhoidectomy specimen. Our patient presented with rectal bleeding, which is consistent with anal cancer but can often be attributed to internal hemorrhoids. Interestingly

he did not have symptoms of anorectal pain, which occurs in approximately thirty percent of patients with anal canal cancer. The staging workup for our patient's lesion was consistent with a T1N0M0 anal cancer. Management of adenocarcinomas arising in the anal canal typically follows the same principles as those applied to rectal cancer. Since our patients tumor was limited to the superficial submucosa transanal excision is adequate and has spared the patient from the morbidity of an abdominoperineal resection.

A RARE CASE OF INFLAMMATORY MYOFIBROBLASTIC TUMOR OF THE APPENDIX ACCOMPANIED WITH ACUTE APPENDICITIS.

P87

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Purpose/Background: Inflammatory myofibroblastic tumor (IMT) was defined as an intermediate soft tissue tumor comprising of spindle cells that exhibit myofibroblast differentiation and numerous inflammatory cells, plasma cells and/or lymphocytes by WHO in 1994, and this was settled on as a universal terminology instead of many confusing names; inflammatory pseudotumor, inflammatory myofibrohistiocytic proliferation, plasma cell granuloma, omental-mesenteric myxoid hamartoma. IMT is an uncommon disease condition that may occur in almost body parts and divided into pulmonary IMT and extra-pulmonary IMT. Extra-pulmonary IMT is more uncommon than pulmonary IMT. Among them, appendiceal IMT is a very rare case, to the best of our knowledge; approximately 12 cases were reported previously.

Methods/Interventions: We are reporting an appendiceal IMT in a 42-year-old male

Results/Outcome(s): A 42-year-old male was referred to the emergency room with right lower abdominal pain which occurred 4 days ago, and tenderness and rebound tenderness were detected at Mc Burney point. Laboratory test revealed white blood cell count of 12100/uL and C-reactive protein of 5.70 mg/dl. About a 4 cm-sized round homogeneous hypodense lesion at proximal appendix with appendicolith inside was noted in the abdominoperineal computed tomography. Preoperatively, this was assumed of periappendiceal abscess. Intraoperatively, however, a 4cm-sized round firm encircling mass at appendiceal base was noted without any abscess, and it needed to be differentiated with some tumorous lesions arising from submucosal layer. The patient underwent laparoscopic cecectomy, and discharged without any complication. Final pathologic report revealed that 4x3.5x3.5 cm sized IMT accompanied with acute appendicitis. It showed no mitosis but mild cellular atypia, and resection margin was negative for tumor cells. In immunohistochemistry, actin was positive; overexpression of activin receptor-like kinase (ALK-1) protein was negative.

Conclusions/Discussion: Appendiceal IMT is an extremely rare mesenchymal tumor and shows intermediate biological behavior with potential of metastasis or local recurrence. The definitive diagnosis can be made by only after histopathologic exam after surgical resection. Complete resection is the treatment of choice, and follow-up is needed for surveillance of local recurrence. IMT should be considered as one of the differential diagnoses when a mass-like lesion in appendix with or without appendicitis is encountered.

THE STROMAL PHENOTYPIC SUBTYPE AND INCREASED RISK OF LOCAL RECURRENCE AFTER RECTAL CANCER SURGERY.

P88

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Purpose/Background: The consensus molecular subtypes (CMS) classify colorectal cancer (CRC) using gene expression data. Based on reported phenotypic features of each CMS, we have reported a novel phenotypic subtyping system which stratifies CRC into four types (Roseweir et al 2017): Immune, Canonical, Latent and Stromal. In a cohort of 81 patients, we found good concordance between CMS and phenotypic subtypes (Roseweir et al., unpublished). Importantly, the stromal subtype corresponded to the CMS4 subtype in 84% of cases. Despite modern combined modality treatment, local recurrence (LR) remains a concern following rectal cancer surgery. Neoadjuvant therapy aims to reduce LR and is allocated based on local staging criteria. No biological or phenotypic criteria presently guide provision of neoadjuvant therapy. In the present study we evaluate whether phenotypic subtypes relate to LR after radical treatment of rectal cancer.

Methods/Interventions: Two independent cohorts of rectal cancer patients who underwent resection with curative intent were identified (UK, n=260 and Australia, n=148). Tumor tissue was available for evaluation; phenotypic subtyping was performed based on immune cell infiltrate, stromal volume and tumor proliferation (Ki67). Phenotypic subtype was correlated with long term outcome, with LR considered as either pelvic or peritoneal.

Results/Outcome(s): The UK cohort included 260 patients who had surgery for rectal cancer between 1997-2007. Most were >65yrs (63%), male (58%) and TNM stage II (39%) or III (37%). 32 (13%) received neoadjuvant therapy. Classified by phenotypic subtypes, 88 (35%) were Immune, 47 (19%) Canonical, 48 (19%) Latent and 67 (27%) Stromal. The Australian cohort included 148 patients who had surgery between 2000-2014. Most were >65yrs (85%), male (67%) and TNM stage II (26%) or III

(43%). 40 (27%) received neoadjuvant therapy. 47 (32%) were Immune, 38 (26%) Canonical, 8 (5%) Latent and 55 (37%) Stromal. In the UK cohort, the median follow-up (FU) was 138 months (minimum 88). 70 patients (27%) developed recurrence, with LR in 23 (8.8%) and systemic in 44 patients (16.9%). In the Australian cohort, median follow up was 46 months (minimum 2). 52 (35%) patients developed recurrence: LR in 12 patients (8.1%) and systemic in 40 patients (27%). In the UK cohort, LR was associated with higher T stage (pT4 17% vs. pT1-3 7%, p=0.024), vascular invasion (15% vs 6%, p=0.018), margin involvement (22% vs 7%, p=0.010), serosal involvement (21% vs 6%, p=0.001), and phenotypic subtype (immune 5%, canonical 6%, latent 4% and stromal = 21%, p=0.002). Similar LR rates were obtained after excluding patients who had NT: Immune (4%), canonical (4%), latent (5%) and stromal (23%). In the Australian cohort, LR was also associated with increased T stage (P=0.011) and phenotypic subtype (immune 4%, canonical 3%, latent 0% and stromal = 16%, p=0.016). Similar LR rates were obtained after excluding patients who had NT: Immune (3%), canonical (3%), latent (0%) and stromal (18%). In the UK cohort 14/23 LR (61%), were Stromal phenotypic subtype. In the Australian cohort, 9/12 (75%) LR were Stromal subtype. In the UK cohort the Stromal subtype was associated with higher node positivity (50% vs 30-44% p<0.05), but across both cohorts there was no difference in rates of pT4 disease, tumor grade, vascular invasion, serosal involvement and margin positivity between Stromal and other subtypes.

Conclusions/Discussion: Local recurrence following rectal cancer surgery is associated with the stromal phenotypic subtype, a proposed surrogate for CMS4. 66% of LR across 2 independent cohorts corresponded to this subtype. Pre-treatment assessment for stromal/ CMS4 subtype may identify rectal cancer subsets at risk of LR and could have implications for selection of patients for neoadjuvant therapy.

INITIAL EXPERIENCE AND EARLY OUTCOMES OF A NEWLY ESTABLISHED CYTOREDUCTIVE SURGERY AND HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY PROGRAM LED BY A COLORECTAL SURGEON AT A SINGLE INSTITUTION.

P89

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Purpose/Background: Cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) is a logistically complex surgical therapy for peritoneal malignancies. CRS and HIPEC are typically performed by surgeons specializing in surgical oncology at specialized

centers and are known for high perioperative morbidity. We have a unique experience with the establishment a CRS and HIPEC program by a surgeon specialized in colorectal surgery. Our objective is to describe the early experience of a new single-institution program for CRS and HIPEC driven by a colorectal surgeon working with a consulting hepatobiliary surgeon

Methods/Interventions: A retrospective chart review of 14 consecutive patients who underwent CRS and HIPEC for non-ovarian peritoneal malignancy at a single academic quaternary referral center between 2016 and 2018 was performed. Patient information including age, previous index operation, pathology, and preoperative chemotherapy was collected. Perioperative information including peritoneal cancer index (PCI) score, receipt of early postoperative intraperitoneal chemotherapy (EPIC) or normothermic intraperitoneal and intravenous chemotherapy (NIPEC), completeness of cytoreduction score (CCs), hospital length of stay (LOS), complications and disease recurrence was collected over a variable length of follow-up.

Results/Outcome(s): Our patient population was on average 53 years old (± 12 years), with mean BMI of 28.8 ± 5.4 , and 57.1% male with peritoneal malignancies of heterogeneous etiology. Primary malignancy was appendiceal in nine patients, colonic in three patients, mesothelioma in two patients. Preoperative chemotherapy was performed in 71.4% of patients (10/14). Mean preoperative PCI was 8.07 ± 4.97 , while the mean intraoperative PCI was 14.36 ± 8.11 , and the CCs was 0/1 in all but a single patient (CCs 2). HIPEC was performed in 93% (13/14) of patients. Mean intraoperative time was 725.5 ± 271.3 minutes. Intraoperative EBL ranged from 100-2000 mL (mean 564.3 ± 497.1). One intraoperative complication (bladder injury which was primarily repaired) occurred. While 63.4% of patients were admitted to the ICU post-operatively, only three required ICU level care for more than 48 hours. Postoperatively, 64.3% of patients received EPIC with 5-FUDR, 14.3% received NIPEC with cisplatin, and 21.4% did not receive either. Mean hospital LOS was 13.2 ± 7 days. Ten of the 14 patients experienced post-operative complications, none of which was greater than Clavien-Dindo 2 classification. The most common complications were thrombotic complications in four patients (28.6%), followed by ileus in three patients (21.4%), neutropenia in two patients (14.3%), surgical site infections in two patients (14.3%), and clostridium difficile colitis in two patients (14.3%). Out of seven anastomoses performed there were no leaks. A hepatobiliary surgeon was consulted preoperatively and provided intraoperative assistance with excision of tumor burden from the right diaphragm, Glisson's capsule, and the porta hepatis for six patients (42.9%). Recurrent or persistent disease was detected in six patients after a mean follow-up of 12.1 ± 6.6 months. There has been no patient mortality to date.

Conclusions/Discussion: The initial outcomes of our early experience developing a new program for CRS and HIPEC driven by a colorectal surgeon are notable for our low perioperative morbidity and mortality as well as our low CCs. While our results are limited by small sample size and short-term follow-up, our early results are promising and support a colorectal-driven, multi-specialty approach to the surgical management of non-ovarian peritoneal malignancies.

THE IMPACT OF A MULTIDISCIPLINARY TEAM AND CANCER-SPECIFIC TUMOR BOARD IN IMPROVING PROCESSES AND OUTCOMES IN PATIENTS WITH RECTAL CANCER.

P91

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Purpose/Background: Recent literature suggests that implementation of rectal cancer-specific Multidisciplinary Team (MDT) meetings, in which 100% of rectal cancer patients are discussed, improve patient care and outcomes in rectal cancer patients treated at large medical centers. Additionally, facilities can now be designated as accredited Rectal Cancer Centers of Excellence by the American College of Surgeons Commission on Cancer (CoC). MDT participation in line with rigorous CoC standards is the cornerstone of this accreditation process. We hypothesized that by following the standards of the CoC National Accreditation Program for Rectal Cancer (NAPRC), our much smaller medical institution would see similar improvements over time in patient care and outcomes compared to those reported in larger centers.

Methods/Interventions: We performed a retrospective review of all rectal cancer patients treated surgically at a single institution from 2014-present. MDT presentation started in October 2015 in line with the proposed CoC Rectal Cancer standards. Demographic information, clinical stage, surgical quality, treatment evaluation, and outcomes were prospectively recorded for each patient after creation of the MDT. These patients were analyzed in 3 groups: Pre-MDT, 2015-16 MDT, and 2017-18 MDT.

Results/Outcome(s): 139 patients were analyzed: 22 in the Pre-MDT group, 50 in the 2015-16 MDT group, and 67 in the 2017-18 group. MDT implementation was associated with significant improvement in 2 of 5 *treatment* variables: rate of MRI use for initial staging (55% pre-MDT; 76% MDT '15-16, $p = 0.06$; 82% MDT '17-18, $p = 0.01$) and rate of MRI use for restaging after treatment (23% pre-MDT; 76% MDT '15-16, $p = 0.009$; 73% MDT '17-18, $p = 0.008$). MDT was also associated with improvement in 2 of 6 *surgical* quality variables: Negative Circumferential Resection Margin rate (86% pre-MDT 97% MDT '15-16, $p = 0.04$; 97% MDT '17-18, $p = 0.04$) and Abdominoperineal Resection Rate (29%

pre-MDT; 31% MDT '15-16, $p = > 0.1$; 14% MDT '17-18, $p = 0.05$). We were compliant in 18 of the 19 CoC NAPRC standards.

Conclusions/Discussion: Implementation of rectal cancer-specific MDT meetings at small-sized but still high rectal cancer volume medical centers, carried out in line with CoC standards, is associated with significant improvement in both treatment and surgical quality outcomes over time. Compliance with the CoC NAPRC standards is both feasible and recommended at smaller medical centers that treat a high volume of rectal cancer.

OPIOID REQUIREMENTS IN LAPAROSCOPIC COLECTOMIES: DO ERAS PROTOCOLS MAKE A DIFFERENCE?

P92

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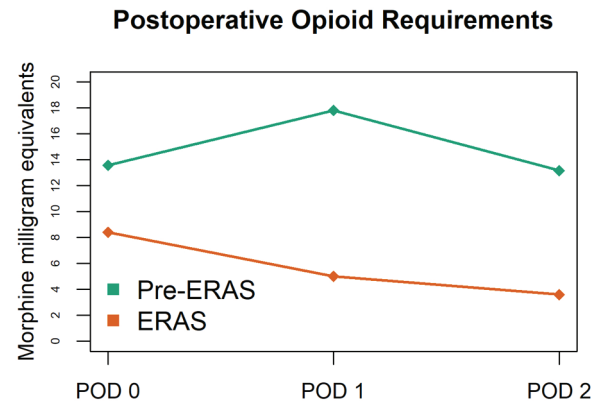
Purpose/Background: Laparoscopic colorectal surgery has been shown to reduce postoperative pain compared to open surgery, and the addition of enhanced recovery after surgery (ERAS) protocols helps to avoid narcotic-exclusive pain regimens. The aim of this current study is to analyze the differences in opioid requirements and pain scores in the immediate postoperative period for patients who underwent laparoscopic colectomies before and after the implementation of ERAS protocols.

Methods/Interventions: A retrospective chart review of all patients undergoing elective laparoscopic colectomies at Beaumont Health in Royal Oak, Michigan, was performed. Two patient cohorts were evaluated: pre-ERAS (December 2013 to July 2015) and ERAS (September 2015 to May 2018). Patient characteristics, pain scores, and postoperative opioid requirements in morphine milligram equivalents (MME) were collected for the first 48 hours after surgery. A generalized estimating equation model with lognormal distribution was used to assess the effect of ERAS protocols and other relevant variables on the total MME.

Results/Outcome(s): A total of 242 patients (122 pre-ERAS and 120 ERAS) were studied. Patient characteristics were similar between groups. Pain scores were lower in the ERAS versus pre-ERAS patients for postoperative day (POD) 0 and 1, and this was statistically significant on POD 1 ($p = 0.01$). Opioid requirements were reduced by 61% in ERAS patients on POD 0-2 compared to pre-ERAS patients (32 vs. 12.5 MME, $p < 0.001$). A reduction in the total MME prescribed at discharge after ERAS implementation was also observed (162.9 vs. 145.5 MME, $p = 0.03$).

Conclusions/Discussion: The growing opioid epidemic has stimulated efforts to minimize narcotic utilization in postoperative patients. ERAS protocols can substantially reduce opioid requirements after elective laparoscopic

colectomies without increasing pain scores. Future efforts should focus on limiting the amount of prescribed opioids on discharge.



HAND-ASSISTED LAPAROSCOPY VERSUS STRAIGHT LAPAROSCOPY FOR COLORECTAL SURGERY – A SYSTEMATIC REVIEW AND META-ANALYSIS.

P93

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Purpose/Background: Hand-assisted laparoscopic surgery (HALS) is an often-used alternative to straight laparoscopy (Lap) in procedures such as those in colorectal surgery. There have been many publications comparing the two techniques in terms of efficacy, intraoperative and postoperative complications, and outcomes. This review aims to analyze all current research comparing these two techniques and uncover if there are any significant differences in terms of patient BMI, operative times, incision lengths, conversion rates, intraoperative and postoperative complications, and length of stay between the two surgical approaches.

Methods/Interventions: A systematic search was performed on the PreMEDLINE, MEDLINE, and Embase databases from their respective inceptions to 1 January 2018, with a reference search performed manually through Scopus. Comprehensive and relevant keywords for HALS and Lap were used. As it was expected that there would be few randomized controlled trials, cohort studies and case series involving more than 10 patients with quantitative data were included into the study. Studies fulfilling predetermined criteria were included, and meta-analysis was performed where possible and data discussed when not.

Results/Outcome(s): A total of 113 records were obtained with 44 studies fitting the inclusion criteria. These studies covered a time period of 1992-2014 with a total of 51031 patient records, although some records may have likely overlapped (4 studies drew their cohort from the National Surgical Quality Improvement Program in the USA). Outcomes measured were BMI, operative times,

incision lengths, conversion rates, intraoperative and postoperative complications, and length of stay. Lap was associated with a higher BMI than HALS (Mean Difference [MD] 0.81, 95% Confidence Interval [95%CI] 0.47-1.15, $p < 0.00001$). Incision lengths were longer in HALS as compared to Lap (MD 2.24cm, 95%CI 1.69-2.79cm, $p < 0.00001$), however, conversion rates were lower in HALS than in Lap (Odds Ratio [OR] 0.42, 95%CI 0.29-0.62, $p < 0.0001$). Operative times were shorter in HALS than in Lap (MD -9.05mins, 95%CI -15.09 - -3.02, $p = 0.003$). There was no significant difference in intraoperative complication rate, however, HALS was associated with a higher postoperative complication rate (OR 1.15, 95%CI 1.06-1.25, $p = 0.0005$). Length of stay was shorter in Lap than in HALS (MD 0.23 days, 95%CI 0.04-0.42 days, $p = 0.02$).

Conclusions/Discussion: HALS is a viable alternative to Lap, however, surgeons will need to use their clinical judgment in weighing up the benefits of lower conversion rates with the risks of higher postoperative complication rates, longer incision length and longer hospital stay. This study included all patients with colorectal procedures regardless of disease category and comorbidities. Further subgroup analysis may be done to provide a better clinical tool for practitioners in the relevant, specific scenarios. Additionally, the vast majority of studies included in this review are cohort studies, resulting in bias and lowering the level of evidence provided.

TRANSANAL ENDOSCOPIC RESECTION IN ADVANCED RECTAL CANCER FOLLOWING NEOADJUVANT CHEMORADIOTHERAPY: SAFE AND EFFECTIVE?

p94

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Purpose/Background: Total mesorectal excision was gold standard management for advanced rectal cancer following neoadjuvant chemoradiotherapy, but this is achieved with increased morbidity and decreased quality of life. Local excision with transanal endoscopic resection was attractive method for organ preservation. The aim of this study was to evaluate the feasibility of transanal endoscopic resection for local excision of rectal cancer and report our outcomes, comparing patients who had neoadjuvant chemoradiotherapy (n-CRT) to those who did not.

Methods/Interventions: From December 2012 through December 2016, patients undergoing rectal cancer excision by transanal endoscopic resection were prospectively enrolled in this study and retrospectively analysis. The primary endpoints were long-term oncologic outcome while secondary endpoints were margin status, specimen quality and suture dehiscence. Local recurrence (LR)

was defined as pelvic lymph node or wound recurrence as determined by clinical, radiological or histological findings. Distal metastasis (DM) was defined as tumor recurrence outside the pelvis with or without LR

Results/Outcome(s): Of the 67 patients with rectal cancer treated by transanal endoscopic resection, there were 28 patients having n-CRT and 39 patients were not. With regard to tumor characteristics, the only statistically significant differences between the two groups were the distance between the tumor and anal verge (4.5 ± 1.7 cm vs. 6.5 ± 3.2 , $p = 0.03$) and the number of patients cN+ (8 (28.5%) vs. 0 ($p = 0.02$) in n-CRT vs. non n-CRT, respectively). The only statistically significant differences of pathology characteristics was the rate of fragmented specimens, higher in n-CRT than in no CRT (28.6% vs. 10.3%, $p = 0.05$). Suture dehiscence was higher in n-CRT group (17.9% vs 2.6%, $p = 0.03$). At a mean follow-up of 41.5 ± 14.6 months, 11 out of 67 patients (16.4%) sustained LR but no statistically significant difference was found between the two groups (21.4% vs. 12.8%, $p = 0.35$). 10 out of 67 patients sustained DM but no statistically significant difference was found between the two groups (21.4% vs. 10.2%, $p = 0.21$). Overall mortality was statistically significantly higher in patients undergoing n-CRT (21.4% vs. 5.1%, $p = 0.04$) but there was no statistically significant difference in cancer specific mortality (7.1% vs. 2.6%, $p = 0.37$). 3-year OS (85% vs. 96%), 3-year cancer specific survival (95% vs. 98%), or 3-year DFS (74% vs. 79%) in patients undergoing n-CRT vs. non n-CRT, respectively. Univariate analysis identified pathology T stage ($p < 0.01$), suture dehiscence ($p = 0.01$) and margin positivity ($p = 0.01$) as being statistically significantly associated with tumor recurrence. After multivariate analysis, pathology T stage (OR=6.782), suture dehiscence (OR=7.910) and margin positivity (OR=4.764) remained statistically significant for tumor recurrence

Conclusions/Discussion: Transanal endoscopic resection performed for advanced rectal cancer after n-CRT was associated with high suture dehiscence and specimen fragmentation rates with high LR and DM rates after mean follow up time of 41 months. Pathology T stage, suture dehiscence and positive margins were strong predictors of tumor recurrence in our study. These results suggest that transanal endoscopic resection is not suitable for locally-advanced rectal cancer after CRT and should only be proposed to highly selected patients with complete response, duly warned of possible unfavorable outcomes.

LATROGENIC GENITOURINARY INJURIES IN COLORECTAL SURGERY: OUTCOMES AND RISK FACTORS FOR EARLY AND LATE INTERVENTION FROM A NATIONWIDE COHORT.

p95

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Purpose/Background: Iatrogenic genitourinary injuries (GUI) are infrequent in colon and rectal surgery but can lead to significant morbidity. Early intervention for urinary tract injuries is paramount in minimizing morbidity and preserving renal function. This study aims to determine the outcomes and risk factors of early and delayed intervention for GUI in patients undergoing colon and rectal surgery.

Methods/Interventions: Data from the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database were analyzed retrospectively from 2012 to 2016. The primary inclusion criterion was patients who had undergone colon or rectal surgery identified by the American Medical Association Current Procedural Terminology (AMA CPT) codes. Patients with GUI were identified and then divided into subgroups including early and delayed operative intervention. Early intervention for GUI was identified by CPT code concurrent with the primary operation during the same anesthesia. Delayed interventions were identified by CPT code for the interventional procedure during a reoperation. Bladder and ureteral injuries were separately categorized. R v3.5.1 (R Foundation for Statistical Computing, Vienna, Austria) was used for the data analysis. Summary statistics were assessed via frequencies and proportions for categorical variables, and means and standard deviations for continuous variables. Univariate and multivariate logistic regression analysis were used to identify predictors of GUI, expressed as odds ratios (OR), 95% confidence intervals (CI), and p-values.

Results/Outcome(s): A total of 257,804 patients met the inclusion criteria with 135,964 (52.7%) female. The combined overall incidence of GUI in colon and rectal surgery was 1.84% (n = 4,733). Average rates of ureteral injury and bladder injury were 1.41% and 0.47% percent respectively. 91.36% of GUI were detected during the index surgery and underwent early intervention, whereas the remainder had a reoperation. GUI rates were significantly greater in open colectomy (OC) compared to laparoscopic colectomy (LC) (2.25% vs. 1.37%, p < 0.0001). Among surgical approaches, OC has the highest risk for GUI compared to LC, robotic colectomy (RC), and rectal resection (2.25% vs. 1.37% vs. 1.50% vs. 1.44%, p < 0.0001). Rectal procedures could not be separately analyzed for open, laparoscopic, or robotic, as NSQIP data does not separate the approach for rectal procedures. Emergency cases had the lowest GUI (1.98% vs. 0.95%, p < 0.0001) but were associated with increased risks for delayed intervention for GUI (OR 1.81, 95% CI 1.09-3.01, p = 0.02) in multivariate

analysis. An increased risk of GUI was observed in patients undergoing surgery for both acute and chronic diverticular disease (2.39%, p < 0.0001 vs. 2.91%, p < 0.0001) than other causes. Multivariate logistic regression analysis for GUI risk factors and delayed intervention is listed in table 1. Laparoscopic surgical approach was associated with decreased risk of GUI compared to open approach (OR 0.37, 95% CI 0.30-0.45, p < 0.0001) but was also associated with increased risk of delayed intervention for GUI (OR 2.4486, 95% CI 1.36-4.40, p = 0.0028). Patients with acute diverticulitis (OR 1.84, 95% CI 1.58-2.14, p < 0.0001) or chronic diverticulitis (OR 1.90, 95% CI 1.69-2.15, p < 0.0001) were associated with an increased risk of GUI, whereas patients with colon cancer were associated with a decreased risk of GUI (OR 0.84, 95% CI 0.75-0.94, p = 0.0021). Stent placement during the index procedure was associated with increased genitourinary injuries (OR 1.56, 95% 1.40-1.73, p < 0.0001), which may signify a selection bias for stent placement for patients with higher risks for injury. Compared to patients without GUI, patients with GUI had significant overall morbidity including wound disruptions (OR 1.27, 95% CI 1.02-1.59, p = 0.0326), wound infections (OR 1.41, 95% CI 1.26-1.57, p < .0001), organ/space SSI (OR 1.54, 95% CI 1.38-1.71, p < 0.0001), sepsis (OR 1.64, 95% CI 1.48-1.82, p < 0.0001), transfusions (OR 2.41, 95% CI 2.25-2.58, p < 0.0001), pulmonary embolism (OR 1.539, 95 CI% 1.16-2.04, p = 0.0028), and acute renal failure (OR 1.365, 95% CI 1.035-1.80, p = 0.0276). GUI was also associated with longer operative duration (281.46 vs. 175.64 minutes, p = < 0.0001) and longer total hospital stay (9.93 vs. 8.12 days, p < 0.0001).

Conclusions/Discussion: Open colon surgery is associated with fewer delayed GUI intervention compared to laparoscopic colon surgery. Stent placement is associated with less risk for delayed intervention. GUI are associated with higher morbidity, LOS, and poor outcome. Delayed operative interventions are associated with worse prognosis. Early detection and intervention are critical to improved outcomes.

Table 1 – Multivariate Analysis of Risk factors for GUI and Delayed Intervention for GUI

	GUI			Delayed Intervention for GUI				
	OR	95% CI	p value	OR	95% CI	p value		
Age, years, mean (SD)	1.00	1.00	1.01	0.0537	1.00	0.99	1.02	0.3878
Sex								
Female	ref	ref	ref	ref	ref	ref	ref	ref
Male	0.94	0.88	1.02	0.1557	0.89	0.66	1.21	0.4616
BMI, kg/m ² , mean (SD)	0.99	0.98	1.00	0.0005	1.01	0.99	1.03	0.5690
Disseminated cancer								
No	ref	ref	ref	ref	ref	ref	ref	ref
Yes	1.62	1.41	1.87	< 0.0001	1.47	0.93	2.33	0.1026
Emergency case								
No	ref	ref	ref	ref	ref	ref	ref	ref
Yes	0.46	0.39	0.55	< 0.0001	1.81	1.09	3.01	0.0226
Surgical approach								
Open	ref	ref	ref	ref	ref	ref	ref	ref
Laparoscopic	0.36	0.30	0.44	< 0.0001	2.45	1.36	4.40	0.0028
Laparoscopic with open assist	0.40	0.33	0.49	< 0.0001	1.10	0.54	2.24	0.7966
Robotic	0.32	0.19	0.55	< 0.0001	2.52	0.54	11.70	0.2388
Robotic with open assist	0.41	0.24	0.69	0.0008	7.87	2.31	26.78	0.0010
Rectal	0.58	0.52	0.64	< 0.0001	1.29	0.87	1.90	0.2056
Other	0.92	0.80	1.06	0.2753	1.33	0.81	2.18	0.2624
Indication for surgery								
Other	ref	ref	ref	ref	ref	ref	ref	ref
Acute diverticulitis	1.84	1.58	2.14	< 0.0001	0.84	0.48	1.46	0.5326
Bleeding	0.63	0.31	1.28	0.2042	1.62	1.18	14.56	0.6659
Chronic diverticulitis	1.90	1.69	2.15	< 0.0001	0.75	0.48	1.19	0.2080
Colon cancer	0.84	0.75	0.94	0.0021	1.52	1.03	2.24	0.0370
Colon cancer with obstruction	0.94	0.75	1.17	0.5842	1.64	0.83	3.23	0.1544
Anastomotic leak								
No leak	ref	ref	ref	ref	ref	ref	ref	ref
Leak, no treatment	1.57	0.92	2.70	0.1003	2.36	0.50	11.12	0.2788
Leak, treatment, noninvasive	1.52	0.93	2.48	0.0949	0.81	0.10	6.39	0.8401
Leak, treatment, invasive but nonoperative	1.28	0.91	1.80	0.1513	4.03	1.83	8.90	0.0006
Leak, treatment, reoperation	0.77	0.55	1.08	0.1310	1.50	0.51	4.42	0.4613
Ureteral stent placement								
No	ref	ref	ref	ref	ref	ref	ref	ref
Yes	1.56	1.40	1.73	< 0.0001	2.16	1.54	3.02	< 0.0001
Operative duration, mins, mean (SD)	1.01	1.01	1.01	< 0.0001	1.00	0.99	1.00	< 0.0001

Table 1. Multivariate analysis for GUI risk factors and Delayed Intervention

RACIAL DIFFERENCES IN THE INCIDENCE, PRESENTATION, AND OUTCOMES OF EARLY AND STANDARD ONSET COLORECTAL CANCER.

P96

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Purpose/Background: The National Cancer Database Colon, Rectosigmoid Junction, and Rectum sub-files from 2010-2015 were reviewed. All patients with adenocarcinoma and race listed as 'white' or 'black' were included. Four groups were created: Caucasians aged 50 or less, Caucasians older than 50, African Americans aged 50 or less, and African Americans older than 50. In total, 246,115 patients were included in the analysis. Demographics, disease characteristics, and patient outcomes were compared between the groups.

Methods/Interventions: The National Cancer Database Colon, Rectosigmoid Junction, and Rectum sub-files from 2010-2015 were reviewed. All patients with adenocarcinoma and race listed as 'white' or 'black' were included. Four groups were created: Caucasians aged 50 or less, Caucasians older than 50, African Americans aged 50 or less, and African Americans older than 50. In total, 246,115 patients were included in the analysis. Demographics, disease characteristics, and patient outcomes were compared between the groups.

Results/Outcome(s): In all age groups, African American patients are initially diagnosed with CRC at a later clinical stage than Caucasian patients. In younger Caucasian patients, 34.1% of patients are diagnosed at Stage IV, compared with 41.2% of younger African Americans ($p < 0.001$). In patients older than 50, 28.3% of Caucasians are diagnosed at Stage IV, compared to 36% of African Americans ($p < 0.001$). Secondly, both racial groups have increased rates of left sided disease in the younger cohort compared to older cohort. However, Caucasians have a markedly larger difference between age groups in left sided predominance. In Caucasians, 83% of early onset CRC is left sided and 64.5% of standard onset CRC is left sided ($p < 0.001$). In African Americans, 69.3% of early onset CRC is left sided and 60.9% of standard onset CRC is left sided ($p < 0.001$). Comparing all patients with early onset CRC, Caucasians are significantly more likely to have left sided cancer than African Americans at 83.2% vs. 69.3% ($p < 0.001$). Africans Americans have a 5% higher risk of mortality than Caucasians, independent of age, tumor location, clinical stage, and histology (95% CI: 3-7%).

Conclusions/Discussion: Africans Americans with CRC are significantly more likely to be diagnosed at Stage IV independent of age compared to Caucasians. Caucasians with early onset CRC are significantly more likely to have left sided tumors compared to Africans Americans.

Figure 1: Racial Differences in Stage at Diagnosis and Anatomical Location

	Early Onset CRC	Standard onset CRC	Significance
Caucasian:			
Diagnosed at Stage IV	34.10%	28.30%	$p < 0.0001$
Left Sided CRC	83%	64.50%	$p < 0.0001$
African American:			
Diagnosed at Stage IV	41.20%	36.00%	$p < 0.0001$
Left Sided CRC	69.30%	60.90%	$p < 0.0001$

THE EFFECT OF TOBACCO SMOKING ON ORGAN-SPACE SURGICAL SITE INFECTIONS AFTER CREATION OF GASTRO-INTESTINAL ANASTOMOSES.

P97

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Purpose/Background: Tobacco smoking has been identified as a major risk factor for the development of post-operative complications among patients undergoing gastro-intestinal surgery. However, its effect on organ space surgical site infections (OS-SSI) after various types of intestinal anastomosis is not well characterized. In this study, we seek to quantify the association between tobacco smoking and OS-SSI within 30 days after surgical creation of a gastro-intestinal anastomosis.

Methods/Interventions: We queried the American College of Surgeons - National Surgical Quality Improvement Program (ACS-NSQIP) from 2005 to 2012 to identify all patients who underwent surgical creation of an anastomosis in the gastro-intestinal tract. Patients were classified as a current smoker, former smoker or never smoker at the time of surgery. Exclusions were made for patients < 18 years old, those with missing information on smoking status or OS-SSI and those with a pre-existing OS-SSI at the time of surgery. Multivariable logistic regressions were constructed to evaluate the independent association between pre-operative smoking status and 30-day OS-SSI while adjusting for relevant patient-level factors. Subgroup analyses were performed according to anastomosis type.

Results/Outcome(s): A total of 194,244 patients were included in our analysis. Among these patients, 48,624 were current smokers (25.03%), 32,536 were former smokers (16.75%) and 113,084 were never smokers (58.22%). Compared to patients who never smoked tobacco, current smokers were found to have 15% increased odds of developing an OS-SSI within 30 days of any enteric anastomosis (adjusted odds ratio 1.15, 95% confidence intervals 1.05-1.25). Former tobacco smokers at the time of surgery were found to have no increased odds of developing an OS-SSI compared to never smokers (adjusted odds ratio 1.04, 95% confidence intervals 0.96-1.13). In subgroup analysis, current tobacco smoking increased the odds of OS-SSI among patients who received an entero-enteric (adjusted odds ratio 1.26, 95% confidence intervals 1.03-1.55), a colo-rectal anastomosis (adjusted odds ratio 1.29, 95% confidence intervals 1.04-1.59) or a colo-anal anastomosis

(adjusted odds ratio 2.04, 95% confidence intervals 1.09-3.82). Similarly, former tobacco smoking also increased the odds of OS-SSI in these patient subgroups when compared to never smokers (entero-enteric anastomosis: adjusted odds ratio 1.25, 95% confidence intervals 1.02-1.53; colorectal anastomosis: adjusted odds ratio 1.24, 95% confidence intervals 1.01-1.53).

Conclusions/Discussion: Tobacco smoking modestly increases the risk of organ-space surgical site infections within 30 days of gastro-intestinal anastomosis, and former tobacco smokers appear to have no increased risk. Given the negative health consequences associated with tobacco smoking, all patients undergoing gastro-intestinal surgery should be advised to quit.

NODAL HARVEST FOR RIGHT-SIDED COLON CANCER: A CASE-MATCHED ASSESSMENT OF LAPAROSCOPIC VS. ROBOTIC APPROACHES.

P98

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Purpose/Background: For patients undergoing a right hemicolectomy for colon cancer, a minimum of 12 lymph nodes should be obtained to ensure an adequate extent of resection and to accurately stage the patient's cancer. As robotic-assisted colectomy (RAC) becomes more prevalent, it is imperative that this newer minimally invasive approach provides equivalent oncologic quality standards when compared to laparoscopic colectomy (LC). The purpose of this study was to evaluate the short-term outcomes, including the quality of nodal harvest, of LC and RAC for right-sided colon cancers. We hypothesized RAC would provide an equivalent number of lymph nodes while improving surgeons' ability to complete the case in a minimally invasive fashion when compared to LC.

Methods/Interventions: A retrospective review of the American College of Surgeon's National Surgical Quality Improvement Program Colectomy Procedure-Targeted Database (NSQIP C-PTD) from 2014 – 2017 was performed. NSQIP C-PTD provides 30-day outcomes data and reports the operative approach of included cases. Patients were identified as having undergone laparoscopic (laparoscopic or laparoscopic with open assist) or robotic (robotic or robotic with open assist) segmental colectomy for malignancy of the cecum, ascending colon, and hepatic flexure. Exclusion criteria included emergent cases, non-elective cases, ASA classification of 5, preoperative sepsis, tumor location distal to the hepatic flexure, and performance of a subtotal or total abdominal colectomy. A total of 9,289 cases were identified [RAC=1,055 (11.4%), LC=8,234 (88.6%)]. RAC cases were then case-matched based on year of operation, ASA classification, BMI, age, sex, tumor location, and stage. Of the

original cases, 140 were excluded due to inability to appropriately match, resulting in 915 pairs. A secondary analysis of case-matched data was performed. Categorical variables were compared with Chi-Squared and Fischer's exact tests as appropriate. Continuous variables were analyzed with independent samples t-tests. All analyses were performed using SAS software version 9.4 (SAS Institute Inc., Cary, NC). $P < 0.05$ was considered statistically significant.

Results/Outcome(s): A summary of the case-matched data is found in Table 1. The case-matched cohort did not significantly vary in baseline demographics or distribution of medical comorbidities from the primary analysis of the entire study population. LC and RAC patients were both majority male, over the age of 65, with an average BMI of 29 kg/m². The prevalence of diabetes, smoking, COPD, CHF, and hypertension was similar between the two groups. However, patients in the RAC were more likely to be Caucasian (86.3% vs. 81.46%, $P = 0.025$) and were also more likely to receive combined mechanical and oral antibiotic bowel preparation than LC (52.73% vs 43.77%, $P < 0.0001$). Tumors were found primarily in the cecum (34.43%) or ascending colon (58.03%) in both cohorts. Operative times were longer in RAC (188±70 vs. 146±62 mins, $P < 0.0001$). Patients undergoing RAC were less likely to be converted to open surgery (3.83% vs. 6.99%, $P < 0.01$). The median number of lymph nodes retrieved was similar between the two groups (RAS 24±11 vs. LAP 23±10) with similar rates of adequate nodal harvest ≥ 12 (RAS 96.16% vs. LAP 96.16%). Overall 30-day complications including wound infection, venous thromboembolism, anastomotic leak, reintubation, return to OR, need for blood transfusion, and *C. difficile* infection were similar between the two groups. RAC patients had a shorter length of hospitalization (4.4 days vs. 4.9 days, $P < 0.05$).

Conclusions/Discussion: In this case-matched analysis of patients undergoing colectomy for right-sided colon cancer, the robotic approach was equivalent to conventional laparoscopy in terms of nodal harvest and short-term outcomes. While RAC cases had significantly longer operative times than LC, they were associated with a lower rate of conversion to open surgery.

IMPACT OF A NOVEL WOUND RETRACTOR WITH CONTINUOUS IRRIGATION ON SURGICAL SITE INFECTION FOLLOWING COLECTOMY.

P99

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Purpose/Background: Surgical site infection (SSI) rates in colorectal surgery remain high among elective operations. The etiology is related to the intraoperative exposure of naturally occurring colonic bacteria at the surgical site. The purpose of this study was to evaluate 30-day

SSI outcomes for a novel wound retractor device that combined barrier protection and continuous intraoperative wound irrigation against the standard wound protector used at our institution.

Methods/Interventions: A single-center retrospective cohort-matched study included subjects who underwent an elective colorectal resection utilizing the novel wound retractor that combined barrier protection and continuous wound irrigation between April 2015 and May 2016. Control subjects were selected from our institution's National Surgical Quality Improvement Program (NSQIP) database during the same time period. Controls were matched for elective case status, procedure type, procedure approach (open vs laparoscopic), diagnosis requiring operation, age, sex, race, body mass index, diabetes mellitus, current smoker status, hypertension, presence of disseminated cancer, current use of steroids or immunosuppressants, wound classification, and American Society of Anesthesiologist (ASA) physical status classification. Our institution's standard wound retractor without irrigation

was used at the extraction site of control cases. SSI occurrences were classified as superficial, deep, or organ space up to 30 days post-operatively. Length of stay was secondarily measured for both groups. Control-matched variables were compared using t-tests and chi-square tests. Fisher's exact test was used to compare SSI rates between both groups.

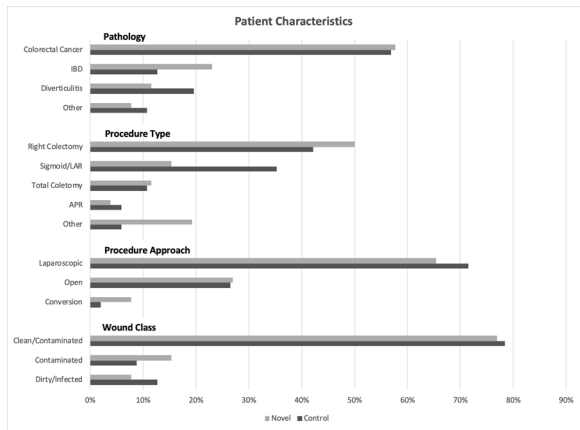
Results/Outcome(s): The novel retractor group included 26 subjects and the control group included 102 subjects. There was no statistical significance between the groups for all control-matched variables ($p>0.05$) with exception of steroid use, which was significantly higher in the novel retractor group ($p=0.0084$) (Figure 1). The novel retractor group had a lower overall SSI rate when compared to the control group after 30-day follow up (0% versus 11.8%, respectively, $p=0.1238$). There were 15 total SSIs observed in 12 control subjects. 5 were superficial SSIs, 1 was a deep SSI, and 9 were organ space SSIs. The novel retractor group also had a shorter length of stay when compared to the control group (median 4 days versus 5 days, respectively, $p=0.1959$).

P98 Table 1: Results of Case-Matched Analysis

	Laparoscopic Colectomy (N=915)	Robotic-Assisted Colectomy (N=915)
Demographics		
Male: N (%) / Female: N (%)	494 (53.99%) / 421 (46.01%)	494 (53.99%) / 421 (46.01%)
Race Caucasian: N (%)	615 (81.46%)	754 (86.37%)**
Race African American: N (%)	99 (13.11%)	83 (9.51%)
Race Other: N (%)	41 (5.43%)	36 (4.12%)
Age: Years \pm SD	69.66 \pm 10.77	69.69 \pm 10.83
BMI: Kg/M ² \pm SD	28.84 \pm 5.61	28.92 \pm 5.63
Operative Variables		
Tumor Location: Cecum N (%)	315 (34.43%)	315 (34.43%)
Tumor Location: Ascending Colon N (%)	531 (58.03%)	531 (58.03%)
Tumor Location: Hepatic Flexure N (%)	69 (7.54%)	69 (7.54%)
Operative Time: Minutes \pm SD	146 \pm 62	188 \pm 70†
Total Nodes Harvested: N \pm SD	23 \pm 10	24 \pm 11
Nodes Harvested \geq 12: N (%)	877 (96.27%)	876 (96.16%)
Converted to Open: N (%)	64 (6.99%)	35 (3.83%)**
T1-Stage: N (%)	124 (13.55%)	118 (12.9%)
T2-Stage: N (%)	194 (21.2%)	183 (20%)
T3-Stage: N (%)	469 (51.26%)	487 (53.22%)
T4-Stage: N (%)	112 (12.24%)	111 (12.13%)
N0-Stage: N (%)	571 (63.02%)	578 (63.31%)
N1-Stage: N (%)	222 (24.5%)	218 (23.88%)
N2-Stage: N (%)	113 (12.47%)	117 (12.81%)
M0-Stage: N (%)	537 (97.28%)	483 (96.99%)
M1-Stage: N (%)	15 (2.72%)	15 (3.01%)
Postoperative Variables		
Total Hospital Stay: Days \pm SD	4.9 \pm 4.1	4.4 \pm 4.4*
Anastomotic Leak: N (%)	22 (2.41%)	23 (2.52%)
Return to OR: N (%)	28 (3.06%)	36 (3.93%)
Discharged Home: N (%)	871 (95.4%)	853 (93.22%)*

All continuous variables are expressed as mean \pm SD --- * $P<0.05$, ** $P<0.01$, † $P<0.001$

Conclusions/Discussion: A novel wound retractor combining continuous irrigation and barrier protection shows promise at reducing the high rates of SSI observed in colorectal procedures. This retrospective study was likely underpowered given the small sample size in our novel wound retractor group. A randomized prospective trial is warranted to further validate our findings.



A NEW ROBOTIC COLON AND RECTAL SURGERY PROGRAM: A TWO-YEAR EXPERIENCE.

P100

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Purpose/Background: A robotic approach has been shown to improve outcomes in colorectal surgery. This minimally invasive technique has been associated with less blood loss, decreased surgical site infections, and shorter time to return of bowel function. It also has been associated with decreased length of stay, improved postoperative physical functioning and less post op pain. This study analyzes a single institution’s initial robotic experience in a newly developed colon and rectal surgery program.

Methods/Interventions: This is a retrospective review of a prospectively maintained database at a single institution. All robotic colorectal surgeries performed by a board certified colorectal surgeon were included from April 2016 to October 2018. A total of 140 cases were completed including 5 ileocecectomies, 27 right colectomies, 1 transverse colectomy, 3 left colectomies, 8 sigmoidectomies, 64 low anterior resections, 8 total proctocolectomies with ileal pouch anal anastomosis, 3 abdominoperineal resections, 8 hartmann reversals, and 4 rectopexies. For illustrative purposes ordinal data is presented as median (mean +/- SD).

Results/Outcome(s): Of our patients, 80 (57%) were done for malignant disease and 60 (43%) were done for benign disease. Operative time had an average of

288 minutes with an average estimated blood loss of 50 mL. Postoperative complications included 2 anastomotic leaks (1.4%), 4 surgical site infections (2.9%), 13 readmissions (9.3%), 2 cardiac dysrhythmias (1.4%), and 1 mortality (0.7%). There were no venous thromboembolisms or urinary tract infections. Two patients required a reoperation within 30 days (1.4%) and 11 cases were converted to open (7.9%). Return to bowel function averaged 2.7 days with an average length of stay of 4 days.

Conclusions/Discussion: The robotic approach in colorectal surgery has been proven to be safe and efficacious as supported by the results of this study conducted at a new robotic colorectal surgery program. The available data in the literature is promising for robotic surgery. However, large prospective, multi-center randomized control trials led by experienced robotic surgeons are still needed to evaluate the benefits of robotic colorectal surgery.

Demographics	(N = 140)	
Age (yrs)	60 (59 + 14.3)	
BMI (kg/m ²)	27 (27.4 + 5.7)	
Operative Time (mins)	288 (296 + 128.8)	
Estimated Blood Loss (mL)	50 (88 + 81.2)	
Length of Stay (LOS) days	4 (5 + 5.2)	
	Percent (N = 140)	
% Men	44%	
% Women	56%	
% Malignant Perioperative Cause	57%	
% Benign Perioperative Cause	43%	
Complications	Our Actual Data	Percent (N = 140)
DVTs	0	0.0%
UTIs	0	0.0%
SSIs	4	2.9%
Leaks	2	1.4%
Readmission (within 30 days)	13	9.3%
Mortality (within 30 days)	1	0.7%
Cardiac Dysrhythmias	2	1.4%
Conversions to Open	11	7.9%

Table 1A: Demographics and Operative Outcomes.

Table 1B: Categories of Operations Performed.

Types of Operations	(N=140)
Right colectomy	27
Left colectomy	3
Low anterior resection (LAR)	64
Total abdominal colectomy	5
Sigmoidectomy	8
Total proctocolectomy with J-pouch	8
Proctectomy	2
Subtotal Colectomy	1
Ileocecectomy	5
Exploratory celiotomy with serosal repair	1
Transverse colectomy	1
Robotic assisted rectopexy	4
Reversal of Hartmann	8
Abdominoperineal resection (APR)	3
Total	140

A NOVEL PREOPERATIVE RISK SCORE TO PREDICT LYMPH NODE POSITIVITY FOR RECTAL NEUROENDOCRINE TUMORS: AN NCDB ANALYSIS TO GUIDE OPERATIVE TECHNIQUE.

P101

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Purpose/Background: Preoperative endoscopic ultrasound (EUS) is an accurate method for evaluating depth of invasion for rectal tumors, but has not demonstrated equal diagnostic sensitivity for evaluating nodal status. However, for rectal neuroendocrine tumors (R-NETS), preoperative knowledge of nodal status would be beneficial in guiding operative approach when choosing between a local or formal anatomic resection. Current recommendations are based solely on tumor size. Using the National Cancer Database (NCDB), our aim was to devise a clinically applicable risk score for lymph node (LN) positivity using other preoperatively known clinicopathologic factors that better discriminates LN involvement than size alone.

Methods/Interventions: All patients in the NCDB (2004-2014) diagnosed with non-metastatic, non-functional R-NETS were included. Tumor size was divided into three categories (<1cm, 1-2cm, ≥2cm). Given their known high concordance, pathologic depth of invasion into the submucosa, muscularis propria, through muscularis propria or adjacent organs was used as a surrogate for preoperative EUS depth of invasion, as the latter data point was not available in the NCDB. Primary aim was to identify factors associated with LN positivity and to develop a Preoperative Rectal Stratification Score (PReSS) for LN positivity utilizing readily available preoperative parameters to identify patients who may benefit from LN retrieval. Secondary aim was to assess the association of PReSS with overall survival (OS).

Results/Outcome(s): Among the 12,172 patients identified, 3% had LNs retrieved (n=383). Median age was 57 years (21-90 years), 52% were male (n=200), and median tumor size was 1.4 cm (0.1-15 cm) with 44% <1cm, 16% 1-2 cm and 40% ≥2cm. Of the 383 patients who had LNs retrieved (median number=14), 43% had positive lymph nodes (n=163). On univariate analysis, age >60, poorly differentiated tumor grade, depth of invasion past the submucosa, and tumor size >1cm, were associated with LN positivity. On multivariable analysis, depth of invasion past the submucosa (muscularis propria: HR 2.03, 95%CI 0.97-4.23, p<0.01; through muscularis propria: HR 7.41, 95% CI 3.28-16.83, p=0.06, adjacent organs: HR 4.08, 95% CI 1.29-12.91, p=0.02), and increasing tumor size >1cm (1-2cm: HR 4.24, 95%CI 2.08-8.65, p<0.01; ≥2cm: HR 3.61 95%CI 1.64-7.92, p<0.01) remained strongly associated with LN metastasis. As each of these tumor characteristics can be determined preoperatively by initial endoscopic evaluation, the incidence of LN positivity was determined for each combination of tumor size and depth of invasion.

Only two patients with invasion through the muscularis propria had tumors that were <1cm, both of whom were LN negative, and no tumors invading into adjacent organs were <2cm. Notably, when evaluating the entire cohort of 12,172 patients, there were only 12 patients that had <1cm tumors invading through the muscularis propria, and 0 patients that had <2cm tumors invading into adjacent organs, making these groups negligible. The remaining groups were combined together based on similar rates of LN involvement. Each variable was assigned a weighted score to create a PReSS of four groups (0-3) associated with an increasing rate of LN positivity (PReSS group 0: 11%, group 1: 38%, group 2: 50%, group 3: 78%, p<0.01; Figure 1). PReSS correlated with 10-year overall survival (PReSS group 0: 90%; group 1: 81%; group 2: 59%; group 3: 41%).

Conclusions/Discussion: For rectal neuroendocrine tumors, depth of invasion and tumor size predict lymph node positivity and both clinicopathologic variables can be readily obtained through a preoperative endoscopic ultrasound. This novel Preoperative Rectal Stratification Score (PReSS) incorporates both variables and stratifies tumors into four risk groups of progressively increasing lymph node positivity. Rather than tumor size alone, this score should be used to guide surgical approach as local resection alone will not yield lymph nodes and may lead to under-staging and anatomic resection may be preferred in patients with higher risk for lymph node positivity.

Figure 1. Preoperative Rectal Stratification Score (PReSS) for Lymph Node Positivity

	<1 cm (0 points)	1-2 cm (1 point)	≥2 cm (1 point)	
Submucosa (0 points)	13% (0 points)	42% (1 point)	33% (1 point)	□ Risk group 0
Muscularis propria (1 point)	36% (1 point)	54% (2 points)	50% (2 points)	▨ Risk group 1
Through muscularis propria (2 points)	N/A	80% (3 points)	83% (3 points)	▩ Risk group 2
Adjacent organs (2 points)	N/A	N/A	70% (3 points)	■ Risk group 3

APPENDICEAL ADENOCARCINOMA: OVERALL SURVIVAL ASSOCIATED WITH ADJUVANT CHEMOTHERAPY IS LOWER THAN EXPECTED.

P103

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Purpose/Background: National guidelines currently recommend similar adjuvant chemotherapy for surgically resected stage III appendiceal and colonic adenocarcinoma. This study evaluated the benefit of adjuvant chemotherapy on overall survival in stage III appendiceal adenocarcinoma compared with colonic adenocarcinoma.

Methods/Interventions: A retrospective review of the National Cancer Database was performed to identify patients with stage III appendix or right colon adenocarcinoma from 2006 to 2013 who underwent right colectomy. Cases were analyzed by use of adjuvant chemotherapy. The Kaplan-Meier method was used to estimate overall survival probabilities.

Results/Outcome(s): In total, 495 appendiceal cases (376 with chemotherapy; 119 without chemotherapy)

and 37,215 colonic cases (24,607 with chemotherapy; 12,608 without chemotherapy) were identified. Three-year survival probabilities for appendix were 0.69 (0.64, 0.75) with chemotherapy and 0.45 (0.36, 0.57) without chemotherapy. Three-year survival probabilities for right colon were 0.76 (0.76, 0.77) with chemotherapy and 0.43 (0.42, 0.44) without chemotherapy. Five-year survival probabilities for appendix were 0.54 (0.48, 0.61) with chemotherapy and 0.36 (0.27, 0.49) without chemotherapy. Five-year survival probabilities for right colon were 0.65 (0.65, 0.66) with chemotherapy and 0.31 (0.30, 0.32) without chemotherapy. Appendiceal cancer patients who received adjuvant chemotherapy tended to be younger (58.8 vs 64.8 years, $p < 0.01$) and have fewer comorbidities (Charlson/Deyo score 0.22 vs 0.35, $p < 0.01$) than colon cancer patients who received adjuvant chemotherapy.

Conclusions/Discussion: Adjuvant chemotherapy is associated with improved overall survival in both appendix and right colon adenocarcinoma. However, with adjuvant chemotherapy, overall survival is worse among those with appendix adenocarcinoma despite decreased age and comorbidities.

THE ASSOCIATION BETWEEN PRIMARY TUMOR LOCATION AND RISK FACTORS FOR RECURRENCE IN PATIENTS WHO UNDERWENT CURATIVE RESECTION FOR STAGE II COLON CANCER.

P104

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Purpose/Background: It is reported that the prognosis and response to chemotherapy for unresectable recurrent colon cancer are different according to the primary tumor location. This appears to be related to pathological and genetic aspects, which may have ramifications for both cancer surveillance and the adjuvant chemotherapy plan. We analyzed and compared the risk factors for recurrence of colon cancer classified as Stage II between the right and left colon.

Methods/Interventions: We reviewed 235 patients with Stage II colon cancer (including rectosigmoid) in multiple facilities from 1994 to 1997, and from 1999 to 2003, and performed histopathological evaluation retrospectively. All

patients were classified by the primary tumor location, and the risk factors for recurrence were analyzed from clinical pathological aspects, including tumor depth, histology, lymph node metastasis, vascular invasion (ly, v), budding, extramural cancer deposition (EX), perineural invasion (PN), and the number of dissected lymph nodes, as well as postoperative outcomes (overall survival rate, recurrence free survival rate). Chi-square test was used for univariate analysis, and multiple logistic regression analysis for multivariate analysis. Five-year RFS (recurrence-free survival) and OS (overall survival) were estimated using Kaplan-Meier method and log-rank test was used to determine the statistical significance.

Results/Outcome(s): Right-sided disease was present in 48.9% (115/235) of the enrolled patients. The 5-year overall survival rate (5Y OS) was 93.0% for the right side of the colon, and 93.3% for the left side. The 5-year relapse-free survival rate (5Y RFS) was 93.0% for the right side of the colon, and 88.3% for the left side. There was no significant difference in 5Y OS and 5Y RFS between right- and left-sided disease. Multivariate analysis of right colon cancer cases did not identify any independent factors associated with an increase in recurrence rate. On the other hand, for the left colon, two independent factors associated with an increase in recurrence rate were venous invasion (v0-1: 6.1%, v2-3: 36.4%, $P = 0.002$), and perineural invasion (PN0: 6.0%; PN1: 34.6%, $P = 0.029$).

Conclusions/Discussion: Among patients with Stage II colon cancer, there were no significant differences in 5Y OS and 5Y RFS between right-sided colon cancer cases and left-sided. When the primary tumor is located on left side, patients with perineural invasion, or venous invasion should be followed up carefully to detect early recurrence, and post-operative chemotherapy can be considered for those patients.

T1 COLORECTAL CANCER UNDERWENT ADDITIONAL SURGICAL RESECTION FOLLOWING ENDOSCOPIC RESECTION.

P105

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Purpose/Background: Recently, technique of endoscopic procedures for colorectal cancer (CRC) patients, such as endoscopic mucosal resection and endoscopic submucosal

P103 Overall survival probabilities

	3 year (CI)	5 year (CI)
Appendix	-	-
With chemotherapy	0.69 (0.64, 0.75)	0.54 (0.48, 0.61)
Without chemotherapy	0.45 (0.36, 0.57)	0.36 (0.27, 0.49)
Colon	-	-
With chemotherapy	0.76 (0.76, 0.77)	0.65 (0.65, 0.66)
Without chemotherapy	0.43 (0.42, 0.44)	0.31 (0.30, 0.32)

dissection (ESD), increasingly progressed. Surgical treatment of CRC patients gradually changed especially in T1 colorectal cancer invading submucosa (SM). Affirmative ESD introduction may prevent from overtreatment and postoperative complication after colorectal resection in T1 CRC patients. We reviewed the CRC patients undergoing additional resection after ESD, and verify whether the indication of endoscopic resection is adequate or not.

Methods/Interventions: In Japan, indication criteria for additional treatment after endoscopic resection of T1 is as follows; (1) positive vertical margin, (2) depth of SM invasion $\geq 1000 \mu\text{m}$, (3) vascular invasion positive, (4) poorly differentiated adenocarcinoma, signet-ring cell carcinoma, or mucinous carcinoma, (5) Grade 2/3 budding at the site of deepest invasion. If any of the following findings is observed during histological examination of the resected specimen, intestinal resection with lymph node dissection is considered as an additional treatment. Among 321 T1 CRC patients undergoing surgical resection, 103 patients underwent additional resection following endoscopic resection between 2011 January and 2016 March were eligible for this study.

Results/Outcome(s): Tumor location was as follows; 24 right side colon, 54 left side colon and 25 rectum. The reasons for additional resection was as follows; 60 depth of SM invasion $\geq 1000 \mu\text{m}$, 48 positive resected margins, 3 vascular invasion, 1 tumor budding. Cancer recurred in 3 patients (2.9%), and 2 of 3 patients showed positive resected margin. Histological examination showed residual cancer cells was observed in 5 (4.9%) resected surgical specimens after ESD and recurred in one patient. Among 60 patients with SM invasion $\geq 1000 \mu\text{m}$, 3 patients showed lymph nodes metastasis, though the patients with SM invasion $< 1000 \mu\text{m}$ showed neither lymph nodes metastasis nor recurrence.

Conclusions/Discussion: Thus, it is feasible that the indications for additional surgery for CRC patients are positive resected margin and SM invasion $< 1000 \mu\text{m}$, but are not vascular invasion, histological grade, and tumor budding, probably because of a small cohort. It is necessary to conduct a larger study.

TAILORING THE RADIOTHERAPY APPROACH IN PATIENTS WITH ANAL SQUAMOUS CELL CARCINOMA BASED ON INGUINAL SENTINEL LYMPH NODE BIOPSY.

P106

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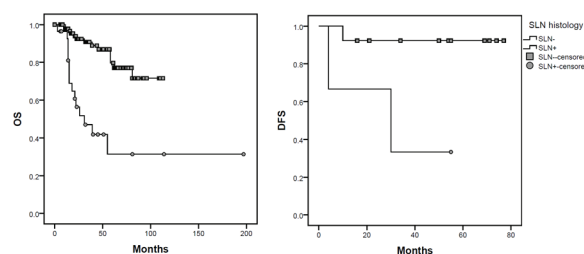
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Purpose/Background: Aim of our study was to analyze, in patients with anal canal cancer, the results of selective inguinal node irradiation, based on the biopsy of the inguinal sentinel lymph node, in terms of local control and prognosis.

Methods/Interventions: Records of patients with squamous cell carcinoma of the anal canal, from January 2001 to December 2016, were reviewed. A lymphoscintigraphy with Tc99 labelled radio colloid injected submucosally around the primary tumor was performed in all the clinically inguinal negative patients; patients in whom inguinal tracer uptake was detected underwent radio guided surgical removal of the inguinal sentinel lymph node(s). All patients were treated with combined radiotherapy and chemotherapy. In patients with negative sentinel node the inguinal area was excluded by the radiotherapy field.

Results/Outcome(s): 123 patients, 76 females (61.8%), mean age 60.1 ± 12.19 years were studied. The intraoperative lymph node retrieval was achieved in all patients with no major complications. The histological analysis showed metastasis in the sentinel lymph node in 28 patients (22.8%): 1 T1 (7.1%), 11 T2 (17.5%), 13 T3 (34.2%) and 3 T4 (37.5%). Mean follow up was 43.44 ± 31.86 months. No inguinal recurrence was observed in patients with negative inguinal sentinel node. A statistically significant difference was observed for overall and disease free survival in the 2 groups of patients with positive and negative inguinal sentinel nodes.

Conclusions/Discussion: In patients with anal canal cancer, the exclusion of the inguinal regions from the radiotherapy field, in patients with negative sentinel lymph node, does not compromise loco-regional control nor prognosis.



Overall (OS) and disease-free survival (DFS) in patients with positive (SN₊) and negative (SN₋) sentinel lymph node biopsy

ONCOLOGIC IMPACT OF ANATOMIC EXTENT OF METASTATIC LYMPH NODES METASTASIS IN STAGE III COLON CANCER: IMPLICATIONS FOR CHOICE OF ADJUVANT CHEMOTHERAPY.

P107

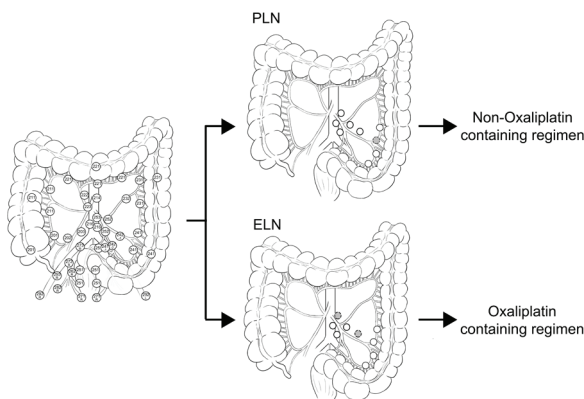
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Purpose/Background: Oxaliplatin based chemo regimen improves the survival outcomes for Stage III colon cancer patients. But, its serious toxicity is well known. The purpose of this study was to determine the difference in survival outcomes among patients who underwent curative resection for stage III colon cancer with PLN metastasis with or without oxaliplatin.

Methods/Interventions: Between January 2010 and December 2014, a total of 254 patients who underwent curative resection in stage III colon cancer were analyzed. Two groups were divided according to their LN distribution (PLN, n=175 vs. ELN, n=79). Clinicopathological features, three-year disease-free survival rate (DFS), and overall survival rate (OS) were analyzed with and without oxaliplatin in PLN group.

Results/Outcome(s): With a median follow-up of 48.5 months, the PLN group showed significantly improved DFS and OS compared to the ELN group (3yr DFS: 88.7% vs 69.6%, $p < 0.001$; 3yrOS: 95.8% vs 77.8%, $p < 0.001$). Whereas, there was no significantly different DFS and OS between the oxaliplatin group and non-oxaliplatin group in the PLN group (3yr DFS: 89.1% vs 88.2%, $p = 0.460$; 3yrOS: 99.0% vs 92.0%, $p = 0.137$). In the multivariate analysis, the addition of oxaliplatin showed no prognostic significance on DFS ($p = 0.073$) and OS ($p = 0.594$). The subgroup analysis in the PLN group with less than two positive LNs also revealed no association in terms of DFS ($p = 0.963$) and OS ($p = 0.683$).

Conclusions/Discussion: Oxaliplatin has no benefit in adjuvant chemotherapy for only PLN metastasis in colon cancer patients. Further study is necessary to determine more adequate subsequent chemotherapy after curative resection.



SHORT- AND LONG-TERM OUTCOMES OF HIGH TIE VERSUS LOW TIE WITH LYMPH NODE DISSECTION AROUND THE INFERIOR MESENTERIC ARTERY IN SIGMOID COLON OR RECTAL CANCER SURGERY.

P108

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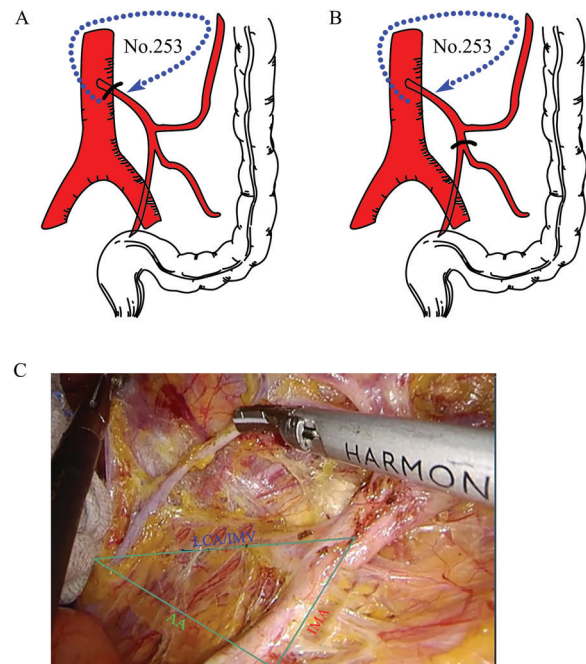
Purpose/Background: Controversy never ceased on the level of inferior mesenteric artery (IMA) ligation in sigmoid colon or rectal cancer surgery. In present study, we aim to reevaluate mortality and morbidity of low tie with dissection of lymph node (LT+LND) at the root of inferior mesenteric artery compared with high tie (HT)

in sigmoid colon or rectal cancer surgery using propensity score matching (PSM) analyses.

Methods/Interventions: A total of 1895 sigmoid colon or rectal cancer patients who underwent curative surgery from 2012 to 2017 in Fudan University Shanghai Cancer Center were included in this study. After PSM, LT+LND-and HT-matched patients were comparable. Ultimately, 277 patients' vessel was detached at the root of IMA and 277 patients experienced the preservation of left colic artery plus lymph node dissection around IMA. The survival outcomes and clinicopathological characteristics were reviewed from the database retrospectively.

Results/Outcome(s): The median follow-up period was 13.7 months (range from 1 to 69 months). No differences between two groups in postoperative complication rate. LT+LND offered similar outcomes for overall survival (OS) and disease-free survival (DFS) as HT. For HT group and LT+LND group, the 3-year OS rate was 90.8% and 90.0% respectively whereas the 3-year DFS was 78.7% and 73.9% respectively. Further, LT+LND was associated with prolonged operation time and less blood loss.

Conclusions/Discussion: LT+LND seems to be less invasive and is not inferior to HT from the point of oncological safety. Further prospective studies and long-term follow-up data are needed.



Surgical schematic of the two groups and the triangular region of IMA. A: High tie; B: Low tie combined with lymph node dissection around the root of the IMA; C: The triangular region of inferior mesenteric artery which consists of abdominal aorta, LCA and IMA.

COMPARATION OF SINGLE OR STAGED SURGICAL MANAGEMENT IN ACUTE OBSTRUCTIVE NON-METASTATIC COLORECTAL CANCER PATIENTS AGED OVER 75: EXPERIENCE IN NATIONAL CENTER OF GERONTOLOGY IN CHINA.

P109

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Purpose/Background: Management of obstructive colorectal cancer can be performed by either emergent resection of the primary tumor and anastomosis (single operation), or the creation of temporary decompression stoma or insertion of self-expandable metallic stents (SEMS) followed by tumor resection (two-staged procedure). The aim of the present study was to compare the short-term outcomes of single and staged surgical management in acute obstructive non-metastatic elderly colorectal cancer patients.

Methods/Interventions: Emergent surgery was defined as operative management within 24h of the first admission. Twenty-two elderly patients (aged over 75) scheduled to receive either single surgery (n=14) or staged surgery (n=8) for the management of acute obstructive colorectal cancer were enrolled in our study from 2012 to 2017. The stoma rate, complications were recorded and compared.

Results/Outcome(s): In stage surgery group, five patients received SEMS, however, the stent failed to pass through occlusive lesions in one patient and turned to single surgery. The success rate of SEMS was 80%. No stent related complication occurred in these four patients. Clinical remission was achieved in all the patients (n=8) in the SEMS and stoma created groups, respectively (p=0.11). The stoma rate was similar in single or staged surgery group. (57.1% vs 37.5%, P=0.38). No difference was found in the rate of total complications (50% vs 25%, P = 0.25). Four patients (28.6%) in single surgery had SSIs and pneumonia occurred in three patients (21.4%), while none of the patient in staged surgery group had infection related complication. Overall, the rate of infection related complication in single surgery group (50%) was statistically significant higher than that of the staged surgery group (P=0.015).

Conclusions/Discussion: Either single or stage surgery is feasible for the management of acute malignant colorectal obstructions in elderly patients. However, single surgery is associated with significant increase in the rate of infection related complication and should be performed with attention.

DOES A APPENDECTOMY BEFORE CYTOREDUCTIVE SURGERY AND HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY FOR APPENDICEAL NEOPLASM INFLUENCE SURVIVAL?

P110

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Purpose/Background: Cytoreductive surgery (CRS) with or without hyperthermic intraperitoneal chemotherapy (HIPEC) improves survival for patients with appendiceal cancer. The majority of patients with an incidentally found appendiceal neoplasm undergo appendectomy before CRS and HIPEC but the impact of a one- versus two- stage operation on short- and long-term outcomes is unknown. Our aim was to evaluate and compare the outcomes of patients with appendiceal neoplasms who underwent appendectomy before or during CRS and HIPEC.

Methods/Interventions: Single-institution retrospective review from 2011 through 2018 including all patients who underwent CRS with or without HIPEC for appendiceal neoplasms. We divided patients into appendectomy-first and single-stage groups. HIPEC was performed using a closed technique with Mitomycin C (20mg/m²) perfused at a mean temperature of 40°C for 90 minutes. Incomplete cytoreduction was defined as residual nodules 2.5mm and greater. Primary outcomes measured included progression-free, disease-free, and overall survivals.

Results/Outcome(s): 70 patients (mean age 55 [44-63] years; 44 women) underwent CRS (57 [83%] with HIPEC) for appendiceal neoplasms. 53 [76%] underwent appendectomy-first and 17 [24%] a single-stage operation. Indications for appendectomy in the appendectomy-first group included appendicitis (42%), appendiceal mass (17%), and pelvic mass (42%). Median time from appendectomy to CRS was 3.9 (1.7-19.6) months. Pre and postoperative chemotherapy, tumor histology, HIPEC and postoperative complications did not significantly differ between the two groups (Table). Patients in the single-stage group were more likely to have incomplete cytoreduction (29% vs. 4%, p=0.002). Recurrent peritoneal disease occurred in 56% of patients at a median follow-up of 11 (4-22) months after CRS. Median progression-free survival was 17 (8-28) months. Overall survival was 23% (n=15) at a median follow-up of 22 (12-41) months after CRS. On multivariate cox analysis, appendectomy prior to CRS had no significant impact on progression-free and overall survival.

Conclusions/Discussion: In this single-center study, appendectomy for appendiceal neoplasms prior to CRS with or without HIPEC did not significantly impact the use preoperative chemotherapy, occurrence of postoperative complications, or oncologic outcomes. Incomplete

cytoreduction, PCI, and tumor biology had the most significant influence on disease-free and progression-free survivals.

FASTER REGION-BASED CONVOLUTIONAL NEURAL NETWORK-AIDED DIAGNOSIS FOR RECTAL CANCER CIRCUMFERENTIAL RESECTION MARGIN OF MRI IMAGES.

P111

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Purpose/Background: High resolution MRI (HR-MRI) is regarded as the best examination method to evaluate whether there is an invasion in circumferential resection margin (CRM) in rectal cancer. We attempted to explore the application of the faster region-based convolutional neural network (Faster RCNN) in the identification and labeling of positive CRM on HR-MRI images.

Methods/Interventions: **1. General Information & HR-MRI Database** 318 patients with rectal cancer in the Affiliated Hospital of Qingdao University from 07/2016 to 08/2018 who were determined to be CRM positive by their HR-MRI images. After excluding substantially degenerative cases, 240 patients were included and a total of 12,258 images of pelvic T2 weighted image (T2WI) HR-MRI were used as image data set, each had 45–60 T2WI HR-MRI image. **2. Parameters of HR-MRI & Scanning Process** GE Signa 3.0T superconducting MR scanner and 16-channel phased-array surface coils were used for scanning, only T2WI and diffusion weigh imaging (DWI) images with the most diagnostic value were extracted. **3. Marking Positive CRM Images** Two senior radiologists read images separately without knowing the pathology results, a total of 1220 CRM-positive images were marked and categorized into the training group (1020 images) and the validation group (200 images) according to the previous grouping of patients. The total time required to identify all CRM+ images was recorded,

P110

Variable	Appendectomy first* (n=53)	Single-stage* (n=17)	P value
Pathology			0.95
Mucinous neoplasm	11 (21%)	4 (24%)	
Adenocarcinoma	31 (58%)	10 (59%)	
Signet ring adenocarcinoma	11 (21%)	3 (18%)	
Grade			0.29
Well-differentiated	29 (58%)	9 (57%)	
Moderately differentiated	9 (18%)	3 (19%)	
Poorly differentiated	10 (20%)	3 (19%)	
Neoadjuvant therapy	13 (25%)	5 (31%)	0.62
Hyperthermic Intraperitoneal Chemotherapy	45 (87%)	12 (71%)	0.13
Incomplete cytoreduction	2 (4%)	5 (29%)	0.002
Operating time, minutes	318 (243-373)	333 (252-410)	0.44
Additional resections			
Right colon	10 (19%)	7 (41%)	0.06
Oophorectomy	10 (19%)	2 (12%)	0.50
Other bowel resection	7 (13%)	1 (6%)	0.41
Diaphragm	7 (13%)	1 (6%)	0.41
Length of hospital stay, days	5 (4-7)	7 (5-10)	0.03
Comprehensive Complication Index	22 (21-35)	21 (21-21)	0.39
Adjuvant therapy	23 (47%)	8 (57%)	0.40
Overall follow up, months	16 (13-24)	24 (12-46)	0.18
Recurrence	10 (67%)	26 (53%)	0.35
Disease free survival, months	5 (3 – 17)	11 (5-31)	0.11
Death	6 (43%)	9 (18%)	0.05
Overall survival. months	16 (14-24)	25 (13-47)	0.13
Progression	7 (54%)	16 (33%)	0.18
Progression free survival, months	7 (3-23)	22 (11-29)	0.03

* Expressed as N(%) or Median (Interquartile range)

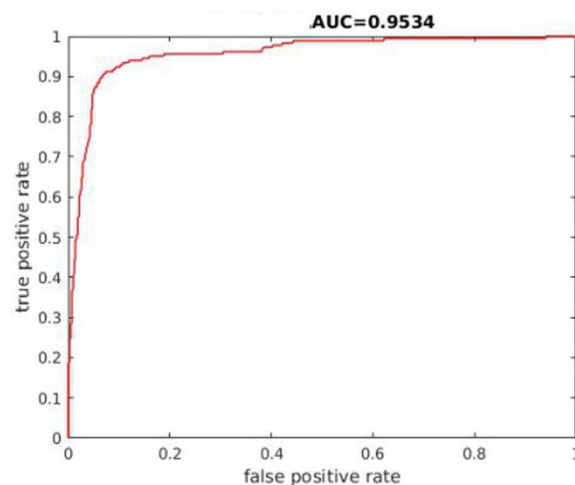
Analysis: chi2 for dichotomous variables and Wilcoxon rank-sum for continuous variables.

and the time used for each patient was estimated. **4. Faster RCNN Procedure** 1020 images of positive CRM in the database were inputted into the FRCNN deep neural network, four-step iterative training of the FRCNN was performed 80,000 times. The results are shown that the Faster RCNN network obtained good attenuation after 240,000 times of training. This study was approved by the ethics committee of the Medical Department of Qingdao University. All of the methods were conducted following the relevant guidelines and regulations and were registered in the Chinese Clinical Trial Registry (registration No. ChiCTR-1800017410).

Results/Outcome(s): In this artificial intelligence platform established by the training set and validated by the testing set, AUC was 0.9534, which was consistent with the diagnosis of senior radiology experts, and eventually, the images with marked target regions and labeled probability scores were outputted. The Faster R-CNN diagnosis time was 10 s/case and has clear advantages than the average time (600 s/case) of the radiologist diagnoses.

1. Evaluation of the training effects of the artificial intelligence platform To reveal the details about how the machine has been learning during the training process, we plotted the PR curve by recording the precision and recall rates. The area under the curve was 0.3670 or AP=0.3670, which indicated a good training effect of Faster RCNN. Therefore, the Faster RCNN had been effectively trained for the images of positive CRM in rectal cancer. The average precision of the main set (MAP) is the average of the mAP of each topic. In this study, the MAP reflects the recognition precision of the Faster RCNN, and the closer it is to 100%. **2. Clinical validation of the diagnosis of positive CRM in rectal cancer by the artificial intelligence system** We categorized all of the labeled areas in the test set into true positive or false positive and obtained the true positive rate (TPR) and false positive rate (FPR) under different probability thresholds. The rates were used to plot the ROC curve, as shown in Figure. the AUC for the Faster RCNN artificial intelligence-aided diagnosis was calculated using the trapezoidal rule, and the value of AUC is 0.9534. The data suggest that the diagnostic ability of the Faster RCNN artificial intelligence approach that finished the training is superior to the radiology experts. In this test, the time for the Faster RCNN artificial intelligence to automatically recognize an image is 0.2 seconds. The automatic diagnosis by artificial intelligence requires 10 seconds, which is far more than the time required for a radiology expert (600 seconds).

Conclusions/Discussion: The application of the Faster RCNN in the identification and labeling of positive CRM in rectal cancer on HR-MRI images has higher precision. Which intuitively and efficiently were used to assist imaging diagnosis.



SURVIVAL OUTCOMES OF APPENDICEAL MUCINOUS NEOPLASMS BY HISTOLOGICAL TYPE AND STAGE: ANALYSIS OF 266 CASES IN A MULTICENTER COLLABORATIVE RETROSPECTIVE CLINICAL STUDY.

P112

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Purpose/Background: Appendiceal mucinous neoplasms are rare, and thus the literature is sparse with regards to histological types, staging, and prognosis. In particular, it is unclear how long-term outcome may differ between mucinous adenocarcinomas and other adenocarcinomas. In the present study, we aimed to investigate the histological types and stages of appendiceal neoplasms, and to evaluate the prognostic impacts of these factors in patients with mucinous adenocarcinomas and non-mucinous adenocarcinomas.

Methods/Interventions: Patients with appendiceal tumors diagnosed between 2007–2016 were retrospectively identified from the databases of 19 institutions in the Clinical Study Group of Osaka University, Colorectal Group.

Results/Outcome(s): A total of 266 patients with appendiceal tumors were identified, of whom 130 had pathologically diagnosed adenocarcinoma, including 57 with mucinous adenocarcinomas and 73 with non-mucinous adenocarcinomas. Five-year overall survival (OS) rates were 64.5% for mucinous adenocarcinomas, and 49.0% for non-mucinous adenocarcinomas. OS was significantly shorter among patients with non-mucinous adenocarcinomas compared to mucinous adenocarcinomas. Among patients with mucinous adenocarcinomas, 5-year OS rates

were 53.6% for stage 0/I, 82.6% for II/III, and 48.4% for IV. Among patients with non-mucinous adenocarcinomas, 5-year OS rates were 90.9% for stage 0/I, 68.8% for II/III, and 7.1% for IV. Analysis of patients with stage IV disease revealed significantly shorter OS among patients with non-mucinous adenocarcinomas compared to mucinous adenocarcinomas.

Conclusions/Discussion: Our present findings showed a better prognosis in patients with mucinous adenocarcinomas compared to non-mucinous adenocarcinomas. In this setting, UICC staging was associated with prognosis for non-mucinous adenocarcinomas, but not for mucinous adenocarcinomas.

DISPARITIES IN OUTCOMES OF ABDOMINOPERINEAL RESECTION BETWEEN PATIENTS WITH ANAL AND RECTAL CANCER.

P113

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Purpose/Background: Abdominoperineal resection (APR) is a procedure performed for both anal and rectal cancer. APR for anal cancer is typically a salvage procedure performed after failure of chemoradiation, whereas APR for rectal cancer is often performed as initial surgical therapy with or without chemoradiation. Demographic differences exist between the two patient populations, most notably that patients with anal cancer are more likely to be immunosuppressed. Our aim was to determine if patients undergoing APR for anal cancer experience different short-term outcomes than those undergoing APR for rectal cancer.

Methods/Interventions: Utilizing the National Inpatient Sample (NIS) database (2004-2014), we identified 76,737 patients who underwent APR for anal cancer (n=9650, 13%) or rectal cancer (n=67,087, 87%). Propensity matched comparisons were performed for the entire cohort. Subgroup analysis was also made after exclusion of immunosuppressed patients. The primary outcome evaluated was 30-day mortality; secondary outcomes assessed included major complications.

Results/Outcome(s): As expected, anal cancer patients had significantly higher prevalence immunosuppression including history of HIV (3.2% vs 0.4%, $p<0.001$), organ transplant (0.6% vs 0.3%, $p=0.013$), steroid use (0.6% vs 0.03%, $p<0.01$), and Crohn's disease (1.9% vs 1%, $p<0.006$). Among matched pairs (n=3400), mortality (1.6% vs 1%, $p=0.024$) and major complications (33% vs 31%, $p=0.03$) were statistically higher after APR for anal cancer. Relative risk of mortality for anal cancer patients was 1.7 (95% confidence interval 1.1-2.6, $p<0.02$), and relative risk of morbidity was 1.1 (CI 1.0-1.2, $p<0.05$) compared to rectal cancer patients. In those patients

who were not immunosuppressed, the mortality after APR (1.3% vs 1% $p=0.27$) was similar, but the morbidity (29.9% vs 27.7%, $p=0.014$) was found to be statistically higher in anal cancer patients.

Conclusions/Discussion: Anal cancer patients experience higher mortality after APR relative to rectal cancer patients. The difference in absolute mortality was small between cohorts, but the increased relative risk of death was significant. While the explanation for this difference is yet unknown, these increased risks should be taken into consideration during surgical management and counseling of patients.

CAPEOX WITH SEQUENTIAL APATINIB IN TREATING RECTAL CANCER AS IDEAL NEO-ADJUVANT CHEMOTHERAPY — A PRIMARY REPORT ON A NEW PREOPERATIVE ONLY CHEMOTHERAPY STRATEGY.

P114

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Purpose/Background: As radiotherapy access for rectal cancer treatment is limited in China, we are using chemotherapy as neo-adjuvant treatment. Our protocol is CapeOx with sequential Apatinib. Here, we report immediate oncologic and side effects of this protocol.

Methods/Interventions: 156 rectal cancer patients were included retrospectively. The protocol was CapeOx (Oxaliplatin 130mg/m², 2h of intravenous guttae, 1st day; Capecitabine 1000mg/m² per time, twice a day, 1st -14th day) for the first cycle followed by three cycles of CapeOx combined with Apatinib. The break between two cycles was 4 weeks. CT and MRI were used to assess oncologic effect. All patients underwent radical resection.

Results/Outcome(s): Clinical complete response was observed in 28 patients (17.95%), partial response in 100 (64.1%), stable disease in 24 (15.38%) and progressive disease in 4 patients (2.56%). Pathologic complete response was observed in 12 cases (7.69%). CEA was significantly changed by the protocol from CEA was 16.75 ± 29.03 ng/ml to 6.51 ± 10.33 ng/ml ($p<0.05$). Adverse events occurred in 74 patients (47.44%) including hand-foot syndrome (18 patients, 11.54%), peripheral neuritis (10 patients, 6.41%), nausea (8 patients, 5.13%) and myelosuppression (8 patients, 5.13%).

Conclusions/Discussion: The neoadjuvant protocol of CapeOx and Apatinib produced excellent clinical and pathologic responses with acceptable incidence of adverse events. Further study is needed to confirm long term efficacy.

CASE REPORT: PRIMARY LUNG CANCER WITH SOLITARY METASTASIS TO RECTOSIGMOID COLON.

P115

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Purpose/Background: Gastrointestinal (GI) metastasis from primary lung cancer is rare. There are few case reports that describe this phenomenon in the literature. However, the majority describe cases of primary lung squamous or large cell histology with metastasis to the upper GI tract and rarely, the colon. Herein, we present a case of primary lung adenocarcinoma with solitary metastasis to the rectosigmoid colon. To our knowledge, there are no prior reports that describe this occurrence.

Methods/Interventions: A 56-year-old man with prior history of lung cancer presented with progressive lower abdominal pain, diarrhea, and weight loss. Abdominal computed tomography imaging and colonoscopy showed an area of heterogenous inflammation at the distal sigmoid colon, suspicious for neoplasm. Positron emission tomography scan revealed hypermetabolism in this area but no new suspicious pulmonary nodules. Multiple luminal biopsies were negative for malignancy. Because the patient's symptoms did not resolve over several months, and there was suspicion for a neoplasm, the patient was offered surgical resection. After the risks and benefits were discussed, he elected to proceed. He underwent

a robotic-assisted low anterior resection with primary colorectal anastomosis in September 2018. He did well post-operatively and was discharged on day five. In regards to his prior lung cancer, he had undergone a right upper lobectomy with lymph node dissection 15 months prior to his colon surgery. Pathological examination of the lung tumor had negative margins and all lymph nodes were negative for malignancy. Immunohistochemical (IHC) staining was positive for thyroid transcription factor 1 (TTF-1) and Napsin A, supporting a diagnosis of adenocarcinoma of the lung. Final pathologic staging was consistent with a pT1aN0 (Stage IA) tumor. The patient continued to smoke after this surgery.

Results/Outcome(s): Pathology of the rectosigmoid colon specimen was consistent with moderately to poorly differentiated adenocarcinoma. IHC was positive for tumor markers highly specific for lung adenocarcinoma, including cytokeratin (CK) 7, TTF-1, and Napsin A, the latter two of which were positive in the patient's lung tumor. In addition, CK 20, which is expressed in 95% of primary colonic adenocarcinomas, was negative (Figure 1). Targeted gene panel was positive for a KRAS mutation. The IHC findings combined with the patient's previous history of lung adenocarcinoma pointed to the diagnosis of metastatic disease in the distal sigmoid colon. IHC is critical for differentiating primary from metastatic colonic malignancies. The patient likely had an aggressive variant of lung adenocarcinoma that caused a rapid progression to a metastatic colon mass.

P114 The Effects And Risks Of The New Preoperative OC Strategy

Effects	Evaluation Indicators	Clinical Effect Assessment	Overall(n=156)	Risks	Type of adverse events	Grade 1	Grade 2	Grade 3	Grade Total
Imageology	Pathology	CCR	28	Risks	Hand-foot syndrome	12	4	2	18
		GPR	100		Nausea	8	0	0	8
		CSD	24		Myelosuppression	4	4	0	8
		CPD	4		Hypertension	2	4	0	6
	Subjective Symptoms	PCR	12		Fatigue	4	0	0	4
		Obvious response	60(38.46%)		Diarrhea	0	2	2	4
		Partial response	2(1.28%)		Stomachache	0	4	0	4
		Little response	70(44.87%)		Peripheral neuritis	10	0	0	10
		No response	16(10.26%)		Anal fistula(tumor)	0	0	2	2
		Unknown	8(5.13%)		Anal pain	0	2	0	2
CEA(ng/ml)	Preoperative	16.75±29.03	Vomit	2	0	0	2		
	Postoperative	6.51±10.33	Heartburn	2	0	0	2		
	Changing value	10.31±24.65	Oil hating	2	0	0	2		
	Statistical magnitude	22.795	Headache	2	0	0	2		
	P	<0.001	Total	48	20	6	74		

Conclusions/Discussion: Metastatic neoplasms in the colon are uncommon and represent only 1% of total colorectal cancers. Even rarer is colorectal metastasis from a primary lung cancer. To our knowledge, there are no reports in the literature of primary lung adenocarcinoma with solitary metastasis to the rectosigmoid colon. Thus, when patients with a history of lung cancer present with progressive abdominal pain or other GI symptoms, the possibility of metastatic colonic disease should be considered.

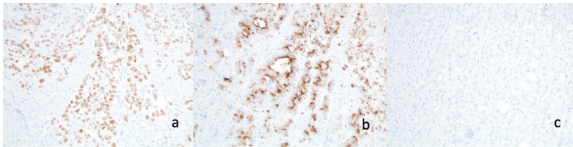


Figure 1. a) Positive IHC staining of TTF-1; b) moderate cytoplasmic staining for Napsin A; c) negative staining for CK 20 (200x magnification)

A SYSTEMATIC REVIEW OF THE MANAGEMENT OF MALIGNANT SMALL BOWEL OBSTRUCTION.

P116

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Purpose/Background: The management of patients presenting with malignant small bowel obstruction is particularly challenging. The aim of this study was to examine different management strategies in these complex patients.

Methods/Interventions: A systematic literature review of EMBASE, MEDLINE, PUBMED and the Cochrane library was performed using PRISMA for studies reporting on the management of malignant small bowel obstruction. The main outcomes evaluated were the type of intervention, 30-day morbidity and mortality and overall survival rates.

Results/Outcome(s): Fifteen studies (n=882 patients) reporting on outcomes for malignant small bowel obstruction were analysed. Eight studies had surgery as the primary intervention outcome, 1 study had surgery and/or percutaneous endoscopic gastrostomy (PEG) tube insertion, 4 reported outcomes of PEG tube insertion and 3 analysed outcomes of other decompression methods of the small bowel. The median age ranged from 52-66 years. The most common cause of malignant small bowel obstruction was gynaecological in nature (56%), followed by colorectal (19%). 486 patients were included from studies that reported on surgical management and the remaining 396 were from the group that had a non-surgical intervention. Median survival in the operative studies ranged from 2.5 to 7.4 months, compared with 0.9 to 1.9 months (p-value <0.05) in the studies focusing on other methods of

small bowel decompression. 30-day mortality ranged from 13-28% in those who underwent surgical interventions and in the non-surgical group this ranged from 2-61% (p-value >0.05). Complications ranged from 21-85% in the surgical group and 12-29% in the percutaneous groups (p-value >0.05).

Conclusions/Discussion: Surgical intervention is associated with increased survival for the management of small bowel obstruction compared to other methods of decompression despite study limitations. It is, however, associated with significant morbidity. It is imperative that realistic goals are set and these limitations are discussed with patients preoperatively.

VALIDATION OF BIOMARKERS OF PREOPERATIVE CHEMORADIOTHERAPY FOR ADVANCED LOW RECTAL CANCER AND EXTRACTION OF THE HIGH-RISK GROUP OF RECURRENCE.

P117

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Purpose/Background: The strategy for advanced low rectal cancer treatment is still controversial. Recently the combination therapy of preoperative chemoradiotherapy (CRT) and chemotherapy is reported to be beneficial. Aim of this study are to validate biomarkers of preoperative CRT for advanced low rectal cancer that reflect disease free survival and to extract the high-risk group that consolidation chemotherapy after chemoradiotherapy is needed.

Methods/Interventions: Retrospective medical record review was performed. From July 2007 to June 2018, thirty two consecutive patients with low rectal cancer (Rb, cT3/4 or N1/2) who underwent preoperative CRT followed by radical surgery were studied.

Results/Outcome(s): Male/Female=23/9, Age (median) 63.8 (36-84). pre CRT clinical Stage2/3a/3b=9/14/9, histological effect after CRT 1a/1b/2/3=16/4/8/4 (pCR=12.5%). {Initial (pre CRT) CEA-final CEA (post crt)}/initial CEA (we call it "CEA-RR") was calculated. Regarding CEA-RR, there were significant differences between 1a and 3 (31.3 vs 60.0; p=0.02), 1b and 3 (11.4 vs 60.0; p=0.02). Median follow up time was 34.1 months. Number of Recurrence was 10 cases and 11 organs (lung 4, liver 3, local 2, peritoneum 1, distant lymph node 1. 3y DFS was 59.0%. We divided object into two groups, which were recurrence group (gr-R) and recurrence-free group (gr-RF), and calculated cut-off value of initial or final CEA from ROC curve for each group (initial CEA cut off value=6.0, final CEA cut-off value=4.5). Regarding final CEA, there was significant difference between two groups. We established four groups as belows. Group1 was "initial CEA<6.0, final CEA<4.5", group2 was "initial CEA≥6.0, final CEA<4.5",

group3 was “initial CEA<6.0, final CEA≥4.5, and group 4 was “initial CEA≥6.0, final CEA≥4.5”. Regarding 3y DFS, there was significant difference between group 1 and group 4 (84.7% vs 12.5%; $p<0.001$). Therefore group 4 should be high-risk group of recurrence.

Conclusions/Discussion: Grouping by initial CEA and final CEA can be a biomarker to reflect DFS. Especially in group 4 which is initial CEA≥6.0 and final CEA≥4.5, consolidation chemotherapy after chemoradiotherapy would be necessary to improve survival. As our study was retrospective and had a small sample size, further investigation should be needed.

DETERMIMING THE LEARNING CURVE OF TATME IN THE SINGLE-SURGEON-TEAM SETTING.

P118

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Purpose/Background: Transanal total mesorectal excision (taTME) has been recently described. The procedure can be performed by synchronous or simultaneous approaches. The advantages of taTME are related to improved access to the pelvis, perpendicular division of the distal mesorectum and minimal invasion to the patient. TaTME can be performed by 1 or 2 two teams in a sequential vs a synchronous approach. Most of the literature has focused on the two team setting, which might not be feasible in all surgical environments. The uptake of taTME requires the overcoming of multiple challenges, proficiency requires a lengthy and complex process. The objective of this study was to determine the learning curve of taTME in a single-surgeon-team setting

Methods/Interventions: A prospectively maintained database was queried. The initial 100 consecutive cases of taTME performed at a high rectal cancer volume tertiary center in Canada by a single-surgeon-team in a 36 month period were included. Characteristics: age, sex, body mass index (BMI), tumor height, TNM stage, neoadjuvant chemotherapy, and neoadjuvant radiotherapy. Outcome measures of interest included binary indicators for anastomotic leak, readmission, conversion rate, intraoperative complications, mesorectal resection quality, tumor margins, postoperative complications, also continuous outcomes for OR duration and LOS Descriptive statistics and frequencies were reported for all study variables. For analysis of binary indicators, outcomes were assessed using a cumulative failures (CUFAIL) approach, where type I error rate (α) and type II error rate (β) were both set at 0.10. The acceptable rates were determined according to the overall rates identified in previous research on TATME learning curves

Results/Outcome(s): Patients average age was 63.67 ±10.82 years, BMI of 27.39 ±6.96, and 68% male gender.

Note that because our sample size was $n = 100$ cases, frequency and proportion are equal. Most binary outcome variables had very small event rates, including intraoperative complications 2% (acceptable rate of 9%), incomplete mesorectal resection 0% (acceptable rate of 1%), positive circumferential tumor margins 3% (acceptable rate of 2%), anastomotic leak 6% (acceptable rate of 15%) and conversion 0% (acceptable rate of 2%). It was deemed inappropriate to attempt multivariate adjustment for these measures, also unnecessary to perform further analyses for most of variables, although the anastomotic leaks indicator was analyzed using the CUFAIL method only. Patients experiencing intraoperative complications included the very first case and case 13. Positive circumferential margins were observed for cases 10, 59, and 94. No incomplete mesorectal resections The CUFAIL analysis of postoperative complications (37%) was conducted for an acceptable rate of $p0 = 44\%$, and unacceptable rate of $p1 = 49\%$. Complications remained below the unacceptable rate and showed improvement for the duration, briefly surpassing the acceptable rate for case 73, and again from cases 84 to 87 before remaining below the acceptable rate from cases 89 through the final case. Postoperative complication was adjusted for neoadjuvant radiotherapy before also calculating RA-CUSUM. The adjusted results had a similar interpretation to the unadjusted outcome where no signals of increased rates were observed, with the cumulative scores remaining below the identified limit for the duration. Furthermore, any potential increases sharply declined around case 55 and remained low for the rest of the observations (Figure 1b). Regarding anastomotic leak (6%) and risk-adjustment was found to be unnecessary for readmission (14%). Therefore, only CUFAIL analyses were performed for these outcomes. Anastomotic leaks ($p0 = 15\%$, $p1 = 20\%$) remained below the unacceptable rate, and any occurrences (table 2a) typically appeared within the first half of the observed cases before leveling off around case 38 and exceeding the acceptable rates by case 71. A similar overall pattern was observed for readmissions ($p0 = 21\%$, $p1 = 26\%$) although an additional cluster of events occurred within the final portion of cases. Despite this observed cluster, rates consistently stayed below the unacceptable limit for the duration, while the acceptable limit was exceeded by case 64 (Figure 2b).

Conclusions/Discussion: TaTME inception is difficult and time consuming. Previous publications on the learning curve of the procedure indicate that proficiency is reached around 50 cases. Outcomes such as completeness of the mesorectum have been used to determine proficiency. In our study we used anastomotic leak as a surrogate of technical proficiency, considering that the complete/near complete mesorectal rate was achieved in 100% of our cases. According to our data the level of proficiency is achieved by case 71, a similar pattern is observed for readmissions. These data indicates that possibly proficiency in the single surgeon setting requires a longer learning curve.

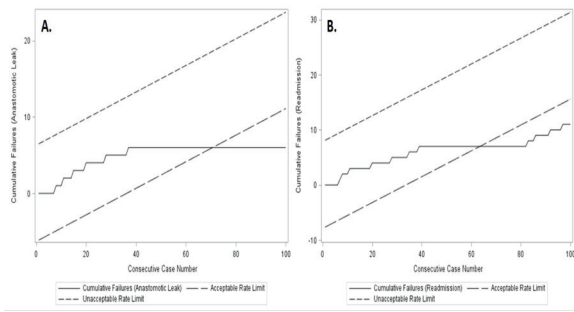


Figure 2. A) Cumulative failure (CUFAIL) chart of binary anastomotic leak variable; B) CUFAIL chart of binary readmission variable

RACIAL GROUP COMPARISON OF KRAS TESTING AND MUTATION RATES IN METASTATIC COLORECTAL CANCER.

P119

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Purpose/Background: *Kristen ras* (KRAS) gene mutations are present in 30-50% CRC and are associated with poor survival and aggressive tumors. KRAS testing is of pivotal importance in determining the optimal treatment regimen in patients with metastatic CRC and have been integrated into CRC treatment algorithms since 2009. Wild-type patients have better outcomes including improved response rate, progression-free survival and overall survival when treated with anti-EGFR therapy (combined with chemotherapy). Due to significant cost of therapy and toxicity in patients with KRAS mutations, genetic testing is mandatory in order to identify patients for whom anti-EGFR treatment is contraindicated. Despite robust evidence and national guidelines that support routine KRAS testing, recent studies have shown that as many as 60-73% of metastatic CRCs are treated without its use. As a result, therapeutic regimens are frequently selected in the absence of key information that genetic evaluation offers. There is also evidence that certain demographic and socioeconomic factors are associated with a decreased frequency of KRAS testing such as older age, racial minorities, public insurance and lower education. Our objective is to evaluate KRAS testing and mutation rates at our institution with the goal of assessing overall adherence to national guidelines, rates of testing and mutations.

Methods/Interventions: We conducted a retrospective, multi-institutional study of patients diagnosed with metastatic CRC between January 1, 2013 and December 31, 2017 at two large community hospitals. Subjects were excluded on the basis of insufficient data such as absence of cancer stage, patient risk factors that contraindicated chemotherapy treatment, patient refusal for treatment and/or election of hospice care, and mortality prior to

treatment. The rate of KRAS mutation testing was calculated for the institution, and for each racial group. Rates of KRAS testing were compared between groups and assessed for significance using Chi-square.

Results/Outcome(s): There were 222 patients diagnosed with mCRC during the time period of interest. Records were unavailable for 63 patients and 30 patients met additional exclusion criteria, which resulted in a study population of 129 patients who were included in our analysis. Patient demographics and clinical characteristics are shown in Table 1. Racial analysis of cohort was 17% (n=22) black, 86% (n=105) white, and 1.6% (n=2) other/unknown. KRAS mutation testing was performed for 75.2% (n=97) of subjects overall. There was no significant difference in the rates of KRAS testing between racial groups ($p>0.05$), with 86.4% (n=19) of black patients and 72.4% (n=76) of white patients tested. In the group tested for KRAS mutations, 94.8% (n=92) of patients received chemotherapy, with 81.4% (n=79) treated with a combination regimen, and 13.4% (13) treated with an unspecified or single agent; 5.1% of patients did not receive any chemotherapy. In the group that was not tested for KRAS mutations, 75% (n=24) of patients received chemotherapy, with 59.4% of patients receiving a combination regimen; 25% (n=8) of patients were not treated with chemotherapy. KRAS mutation testing was associated with chemotherapy treatment ($p=0.001$) and with a combination regimen ($p=0.01$). KRAS mutations were identified in 41.2% (n=40) of all patients and 58.7% (n=57) wild-type. There was no association between racial group and KRAS mutations ($p>0.05$), with 42.1% (n=8) of black subjects with KRAS mutations, compared to 39.5% (n=30) of white subjects.

Conclusions/Discussion: Our results show that 75.2% of eligible patients had KRAS mutation testing at our institution, a higher percentage than reported in previous studies. There was no evidence of racial disparity in KRAS mutation testing between black and white patients. Although black patients did have a higher percentage of KRAS mutations than white patients, it was not a statistically significant difference, although this may have been a result of our small sample size. Although KRAS testing is recommended for all patients with metastatic CRC, efforts at increasing its use should be directed at patients treated with chemotherapy. Our review shows that a quarter of our patients with mCRC treated with chemotherapy may have received a suboptimal regimen. Unfortunately, the full clinical impact of these results cannot be determined by this database review, and further research is needed to emphasize the importance of KRAS testing in mCRC.

A MAIN CAUSE FOR THE IMPAIRMENT OF ANAL FUNCTION AFTER INTERSPHINCTER RESECTION: FROM PATHOLOGY TO CLINICAL PRACTICE.

P120

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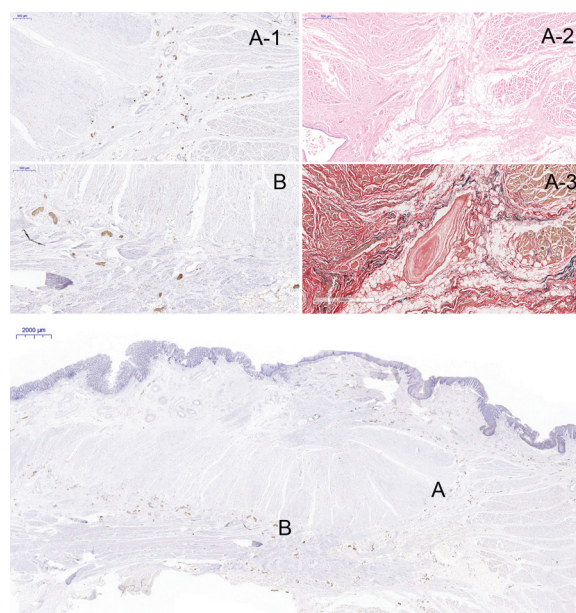
Purpose/Background: Abdominoperineal resection has been standard of care for rectal cancers in the lower third of the rectum 5cm from the anal verge. However, a permanent stoma affects the quality of life of the patients. With better understanding of the oncologic behavior and a reduction of an acceptable distal margin from 5 cm to 2cm or even 1cm, more sphincter saving surgery were done without decreasing oncologic results. The intersphincter resection (ISR) for ultra-low rectal cancer was originally proposed by Schissel et al. This involves dissecting into the intersphincter space and resecting different amount of internal anal sphincter (IAS) while preserving the external sphincter. However, fecal incontinence occurs more frequently after ISR. Most people think that this is due to the removal of IAS, leading to poor anal function postoperatively. However, the literature shows no significant difference among the partial IAS, subtotal ISR, and total ISR, which suggests there may be other factors at play other than the removal of IAS. The purpose of this paper is to detect these factors by conducting pathological study and investigating the microstructure of the anorectum.

Methods/Interventions: Fourteen surgical specimens of patients, who underwent APR in Department of Colorectal Surgery at the First Affiliated Hospital of Naval Military Medical University from November 2016 to April 2017 were collected. Hematoxylin-eosin staining was used to confirm the section was in the right plane, and the Victoria blue staining was used to detect the overall structures of tissues. For clearly indentifying the nerve fibers, paraffin-embedded tumor tissues were examined for S-100 protein expression. For comparison of the nerve densities in the subcutaneous or submucosa at 1.5cm, 1cm, 0.5cm, 0cm, -0.5cm from the dentate line, the number of nerve fibers in 10 × view was counted. For comparison of the density in different layers of the rectum, the nerve density 5mm below the dentate line was counted, which presented the most obvious nerve fibers. 4 serial views of 10× were selected from each layer, and the average value was calculated. For further investigating the diameter of the nerves in different layers, 10 areas of 10× with the most obvious existence of nerve fibers were chosen in each layer, and then largest diameter in each area was selected, thus 10 diameters were chosen for each layer.

Results/Outcome(s): The densities of nerve fibers 1.5cm, 1.0cm, 0.5cm, 0cm and -0.5cm above the dentate line are 2.90 ± 1.68 , 4.06 ± 2.50 , 4.94 ± 3.87 and $8.48 \pm 6.42 \mu\text{m}$,

respectively. The density of 1.5cm is less than the 0cm ($P=0.03$), -0.5cm ($P=0.01$) above the dentate line. The density of -0.5cm above the dentate line is higher than the rest area (all $P<0.05$). The density of nerve fibers in the vicinity of the dentate line is higher than the area far from the dentate line, especially the area 5mm below the dentate line. Besides, the intersphincter space (ISS) has the highest density and the largest diameters of nerves fibers. The density from the highest to the lowest was $\text{ISS} > \text{IAS} \approx \text{submucosa} > \text{external anal sphincter (EAS)}$. Pacinian corpuscles and a lot of elastic fibers can be found in ISS as well. Diameters from the largest to the smallest were $\text{ISS} > \text{EAS} > \text{submucosa} \approx \text{IAS}$. Plenty of elastic fibers existed in the conjoint longitudinal muscle and submucosa especially below the level of dentate line. The elastic fibers interweaved with collagen fibers, and branched into the subcutaneous external sphincter and linked with the dermis of anal verge. Muscles are usually between the elastic fibers and form structures like sandwich. Pacinian corpuscles could also be found in ISS accompanied by vessels and loose fat tissue, but could not be found near the dentate line in the ISS, they exist only in the wide space of ISS.

Conclusions/Discussion: The presence of rich nerve fibers and Pacinian corpuscles in the intersphincteric space suggests that internal anal sphincter should be preserved as much as possible to retain the submucosa nerves around the dentate line and avoid too much or wider dissection in the intersphincter space.



LONG-TERM ONCOLOGIC OUTCOMES OF PRIMARY RECTAL CANCER TREATED WITH LAPAROSCOPIC APPROACH: A 12 YEARS COHORT STUDY.

P121

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Purpose/Background: The role of laparoscopic surgery for rectal cancer has grown constantly in the past decade. While it has proven to be associated with numerous benefits, debate remains when it comes to its oncological safety. The aim of this study is to assess the long-term oncologic outcomes of laparoscopic surgery (LS) compared to laparotomy (LA) for rectal cancer.

Methods/Interventions: Consecutive patients treated for rectal cancer were identified at a single tertiary care center between 2003 and 2015. Patients who underwent LS were compared to those who had LA. The primary outcome was 5-year overall survival. Secondary outcomes included 5-year disease free survival (DFS), local and systemic recurrence rates and appropriate oncologic procedure rates. We made a follow-up on all patient during 2018 by a standardized questioner. By this follow up, we evaluated the recurrence of the cancer, the mortality and, if the stoma was closed.

Results/Outcome(s): During the study period, 579 patients underwent radical surgery for rectal cancer. Of those, 465 were operated with LS (82%). 25 patients needed a conversion to laparotomy during surgery for complications or a challenging dissection (5%). In the laparoscopic group, 122 (26%) patients died since the surgery. The 5-years overall survival was 75% on the LS group vs 58% in the LA group. Only 6 (1.3%) patients operated by LS died precociously after the surgery (< 30 days) against 1 (1%) patients in the LA group ($p=1$). The recurrence was 22% in the LS group (local 9% (42/465), distance 20% (92/465)) versus 30% in the group operated by LA (local 10% (10/104), distance 29% (29/104)) with variable p non-significative. The 5-years disease-free survival was 76% (LS) vs 67% (LA). The evaluation of the mesorectum by the pathologist team began around 2010 in our center. In the LS group, 90% was complete or quasi-complete versus 91% in the group of laparotomies. The rate of negative radial marge was similar in both group (5.2 (24/464) LS vs 6.9 (7/102) LA, $P = 0.6308$). The rate of anastomotic leak was 20% in the laparoscopic group versus 19% in the group of laparotomies.

Conclusions/Discussion: The present study demonstrates the oncologic safety of laparoscopic surgery for rectal cancer when compared to open surgery. Considering the numerous advantages of laparoscopy on perioperative outcomes we suggest that this approach should be strongly considered for the treatment of rectal cancer.

IS COMPLETION RESECTION NECESSARY FOLLOWING ENDOSCOPIC RESECTION OF T1 POLYP CANCERS?

P122

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Purpose/Background: Colorectal cancer (CRC) is the third most common cancer in the western world and a leading cause of death in the UK. Survival of CRC is dependent upon disease stage at presentation. A combination of bowel cancer screening and increased awareness of CRC generally has led to detection of increased numbers of early stage T1 "polyp cancers". There is still a great deal of debate about the management of T1 colorectal cancers, specifically whether these cases can be managed solely by endoscopic removal or whether a formal colorectal resection is necessary, because of the risk that tumour cells remain within the bowel wall or locoregional lymph nodes following endoscopic polypectomy. A segmental resection serves to clear the patient of residual tumour but carries risk of morbidity and mortality and may be entirely unnecessary if there is no residual disease at all in the specimen. We present the management and follow up of all T1 colorectal cancers over a five-year period.

Methods/Interventions: All new consecutive T1 CRCs treated at a single District General Hospital between January 2013 and December 2017 were included in this study with all new cases of colorectal cancer undergoing operative intervention prospectively recorded on a database. All new endoscopically resected T1 cancers were identified in the same time period from hospital histopathological records. Those patients with synchronous carcinomas or inherited polyp conditions were excluded. Patient demographics, operative details including site, operation, post-operative complications and evidence of recurrence and mortality were recorded, and a similar dataset for the endoscopically resected polyps. Histopathological morphological and staging classification was recorded using the UK Royal College of Pathologists Minimum Dataset for CRCs. Patients were divided into three groups for analysis; endoscopic polypectomy, immediate resection (following biopsy) or completion resection following previous polypectomy attempt.

Results/Outcome(s): Of a total of 127 patients included in this study, endoscopic polypectomy was initially performed in 73 (57.5%) of whom 33 (45% of polypectomies, 25.9% of total) subsequently underwent completion resection. 54 (42.5%) patients went straight to major resection. 77 were men (60.6%) with no significant difference in sex across the groups. The median age at time of definitive treatment was 74 years for all surgical intervention (range 39-92 years old) and 77.5 years for endoscopic polypectomy (range 54-95 years old). There was a significant difference in mean tumour size between all polyps initially resected at endoscopy and those who went

straight for resection (19.3mm and 31.1mm respectively, $P < 0.005$). 52 lesions were located in the rectum (40.9%). Disease recurrence was found locally in one endoscopic polypectomy patient, and two others were diagnosed with distant metastatic disease (plus one unconfirmed) and died. All of these patients had Kikuchi/ Haggitt invasion levels of 3, and all 4 had deep margins involved. Only 1 had definite vascular invasion recorded. All were deemed too unfit at multi-disciplinary team meeting for escalation of treatment to completion resection. One or more peri-operative complications were recorded in 26 patients (29.8%), although none were above a Grade 3b on the Clavien-Dindo classification score.

Conclusions/Discussion: Our results support findings in other series suggesting completion resection following endoscopic polypectomy with its associated risk of complication, may be indicated in fewer cases than in current surgical practice. Results across the 3 treatment groups are similar for demographic and polyp features, except for size, the resection group being significantly bigger. The smaller endoscopically resected T1 cancers are often unsuspected findings in clinically benign polyps. The larger tumours going straight to resection more often had positive lymph nodes compared to the completion group. 12% completions had residual tumour, either in lymph nodes or in the polypectomy scar. The risk of positive lymph nodes in all resections was low, recurrence even more so and these two factors were not associated. Deep margin involvement was positive for all 4 cases of recurrence in the endoscopic group, one completion resection case of recurrence had residual carcinoma in the specimen. The overall risk of adverse outcome (local or distant recurrence) was 7.5% for polypectomy only, 3% for the completion group and 2% in the resection group, and not significantly different. There may be selection bias as patients whom have had a high-risk polyp cancer removed, but are more elderly and comorbid, may not be put forward for completion colectomy. However, mortality across the groups was found to be similar. Overall therefore, size of polyp appears to be a positive predictor of lymph node involvement, but deep margin involvement may be the most significant risk factor for recurrence.

THE CLINICAL OUTCOMES OF HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY AFTER COMPLETE CYTOREDUCTION WITH CONCURRENT LIVER SURGERY IN PATIENTS WITH SYNCHRONOUS PERITONEAL AND LIVER METASTASES FROM COLORECTAL ORIGIN.

P123

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Purpose/Background: Hyperthermic intraperitoneal chemotherapy (HIPEC) after cytoreductive surgery (CRS) has been developed as an effective treatment for selective patients with peritoneal metastatic colorectal cancer (CRC). However, in patients with synchronous liver and peritoneal metastases from CRC, the safety and effectiveness of concurrent liver surgery with CRS and HIPEC has not been established. The aim of this study is to evaluate the clinical outcomes of CRS and HIPEC combined with liver surgery.

Methods/Interventions: From September 2014 to July 2018, a total of 23 CRC patients with synchronous liver and peritoneal metastases underwent CRS and HIPEC with concurrent liver surgery at a single tertiary referral center, Seoul, South Korea. The patients who had non-colorectal origin cancer, other hematogenous extraperitoneal metastases except liver (e.g. Lung), incomplete cytoreduction (CC-2 or 3), or liver resection due to liver surface seeding without parenchymal metastases were excluded. Peritoneal cancer index (PCI) score and completeness of cytoreduction (CC) score were assessed intraoperatively. After cytoreduction, concurrent liver surgery including liver resection and/or intraoperative radiofrequency ablation was performed. Some of the selected patients underwent 2-stage hepatectomy when they had multiple liver metastases initially not eligible to a single hepatectomy procedure. two-stage hepatectomy was completely achieved when they acquired resectability after the first stage liver surgery including portal vein ligation. Intraperitoneal chemoperfusion with mitomycin C ($35\text{mg}/\text{m}^2$ at 42 to 43 degrees Celsius) in 3L hypertonic solution (Dianeal, 1.5% Dextrose Peritoneal Dialysis Solution) was performed using 'open Coliseum technique'

P122 Results of three patient groups with adverse outcome defined as local or distant recurrence

	Polypectomy only	Polypectomy and completion	Resection
Total number	40	33	54
Lymph node metastases present	-	2 (6%)	10 (19%)
Local residual tumour	-	2 (6%)	-
Local recurrence	1 (2.5%)	-	1 (2%)
Distant recurrence	2 (5%)	1 (3%)	-
Overall adverse outcome	3 (7.5%)	1 (3%)	1 (2%)

during 90 minutes. The temperature of the chemical solution was maintained by the hyperthermia pump (The Belmont Hyperthermic Pump). Mitomycin C was initially inserted 17.5mg/m², and additionally inserted 8.8mg/m² at 30 and 60 minutes, respectively. Reconstruction of resected bowel was performed after HIPEC. Perioperative outcomes, overall survival (OS), and progression free survival (PFS) were analyzed retrospectively.

Results/Outcome(s): The median peritoneal cancer index (PCI) score was 13 (range 0-26) and they were stratified as follows: PCI <10, 8 (34.8%); PCI 10-19, 11 (47.8%); PCI ≥20, 4 (17.4%). All patients were achieved complete cytoreduction (CC-0, 100%). The median numbers of liver metastases were 3 (range 1-13). The mean total operative time was 11.4 ± 2.6 hours, and the mean operative time of concurrent LS was 3.0 ± 2.4 hours. 6 patients (26.0%) were performed 2-stage liver surgery and the mean interval duration between the first liver surgery and the second liver surgery was 23.3 ± 17.3 (range 12-58) days. The mean length of hospital stay was 26.5 ± 18.4 days. Postoperative complications were noted in 16 patients (69.5%) during hospital stay, and major complications (Clavien-Dindo classification grade 3-4) were found in 4 patients (17.4%) with 1 mortality (4.3%). All patients except 1 mortality case were treated with adjuvant chemotherapy, and the median interval between the surgery and the first adjuvant chemotherapy was 46 (range 21-302) days. The median follow up period was 14.2 months. The median overall survival (OS), and the median progression-free survival (PFS) were 16.7 months (95% CI 16.0-17.4), and 6.7 months (95% CI 3.5-10.7).

Conclusions/Discussion: Concurrent liver resection with CRS after HIPEC was feasible and safe according to our early experiences. A large-scaled data is required to conclude the effectiveness to treat CRC patient with liver and peritoneal metastases.

PREDICTIVE FACTORS OF RECURRENCE AFTER ANAL CONDYLOMA TREATMENT.

P124

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Purpose/Background: Risk factors for recurrence after anal condyloma treatment were examined.

Methods/Interventions: A retrospective study based on a prospective collected database was performed. All patients who underwent condyloma treatment between January 2013 to December 2017 with complete clearance and follow-up higher than 6 months were included. Uni and multivariate analysis were performed with 14 variables to identify possible related risk factors for recurrence [gender, HIV positive, pharmacologic immunosuppression, sexually transmitted infection background, smoking,

sexuality, men who have sex with men (MSM), anal sex practice, number of sexual partners, polygamy in the last year, anal intra-epithelial neoplasia grade II-III, oncogenic HPV, location and severity of condyloma].

Results/Outcome(s): 247 patients were included. 150 (61%) were treated with clinician-applied topical agents (90% trichloroacetic acid +/- 25% podophyllin) and 97 (39%) with electrosurgery. 196 (79%) were men [143 (73%) MSM]. The average age was 34 +/- 11 years. 58 (23%) were HIV-positive. Five (2%) were receiving immunosuppressive therapy. 98 (40%) had smoking history and 166 (67%) practiced receptive anal sex. The mean age of sexual initiation was 18.2 +/- 3.2 years old and the average number of sexual partners was 27.2 +/- 56. 123 (50%) practiced polygamy in the last year. The location of the warts were: 100 (41%) perianal; 67 (27%) intra-anal; 80 (32%) in both areas. According to the Silvera index, the severity of condylomatosis was: 125 (50%) minimal; 103 (42%) moderate; 19 (8%) extensive. The prevalence of high-grade anal intraepithelial neoplasia was 7.2% (18 patients). HPV genotyping was performed in 48 patients [HPV 6: 18 (38%); HPV 11: 26 (54%); HPV 16: 4 (8%)]. Participants were followed for a mean of 20 (range, 6-60) months after primary treatment and 65 (26%) presented recurrence after a median time of 3 (range, 2-21) months. In the univariate analysis, patients with moderate severity of condyloma presented higher recurrence (37% vs. 19%; p < 0.05). In the multivariate analysis, patients with moderate severity of condyloma was associated to a higher incidence of recurrence (p = 0.01, OR = 2.57, IC95% = 1.20-5.52). Patients with extensive severity of condyloma had more recurrence (58% vs. 25%) but the difference was not significant (p = 0.13, OR = 2.54, IC95% = 0.74-8.73). (Table 1)

Conclusions/Discussion: The incidence of recurrence was 26%. Patients with moderate and extensive condylomatosis had higher chances to have recurrence. The severity of presentation should take into account in order to define the follow-up after treatment.

Table 1. Multivariable logistic regression for recurrence

Variable	% Recurrence	p	OR	CI 95%
Male gender	28 vs 18	0.43	1.50	0.54 - 4.13
MSM	30 vs 20	0.91	1.07	0.29 - 3.97
STI background	35 - 25	0.30	1.49	0.69 - 3.22
HIV	29 - 25	0.78	0.90	0.43 - 1.89
Perianal / Intra-anal location	31 vs 24	0.55	0.81	0.41 - 1.61
Moderate severity	37 vs 19	0.01	2.57	1.20 - 5.52
Extensive severity	58 vs 25	0.13	2.54	0.74 - 8.73

MSM: Men who have sex with men. STI: Sexually transmitted infection

EXTENSIVE PERINEAL AND SCROTAL EMPHYSEMA AS PRESENTATION OF ANAL FISTULA.

P125

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Purpose/Background: The management of anal fistula cannot be undertaken without a thorough understanding of their etiology, and the anatomy of the anal canal and sphincter complex. The disease represents a wide spectrum of complexity and is often misdiagnosed and poorly treated by surgeons and physicians who lack experience. A fistula is defined as an abnormal connection between two epithelial lined surfaces such as a set of organs or vessels, which do not normally connect, the connection between the distal alimentary tract and the integument.

Methods/Interventions: We present here a very rare case of a complicated perianal fistula that presented with surgical emphysema to the perineum, scrotum and the lower abdominal wall (mimicking necrotizing fasciitis)

Results/Outcome(s): as well as the management technique will be described as it showed a successful result over the follow up of the patient with complete cure.

Conclusions/Discussion: Management of anorectal abscess and fistula requires an in-depth knowledge of pelvic floor anatomy and associated potential spaces whereby purulent material can travel.

CHRONIC FECAL INCONTINENCE SECONDARY TO LIDOCAINE/BUPIVACAINE INDUCED MYOTOXICITY OF ANAL SPHINCTER COMPLEX: A CASE REPORT.

P126

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Purpose/Background: Local anesthetic-induced myotoxicity has been described to occur in several animal models, however rarely noted to present clinically in humans. The exact mechanism as to why the manifestation remains mostly subclinical is still to be determined. In this study, we report a patient that resulted in complete loss of anal sphincter tone after an intersphincteric block.

Methods/Interventions: A 59 year old male, with otherwise normal fecal continence, was being evaluated for a history of anal superficially invasive squamous cell carcinoma (SISCA) lesion treated with local resection over 1 year prior. He received a multi-quadrant anal intersphincteric nerve block using 10mL aliquots of 0.5% bupivacaine, mixed with 1.0% epinephrine and 1.0% lidocaine. The examination was uneventful, and no procedure was performed. There was no use of electro-cautery nor were any incisions made. The patient was hemodynamically stable throughout the case and was recovered in the post-anesthesia care unit without

event. Several days afterwards, the patient noted to have persistent anal swelling with complete fecal incontinence. He was otherwise normal, afebrile and without any other symptoms. He was urgently evaluated and noted to have a patulous anus with a hypotonic sphincter on rectal exam. There were no signs of infection or abscess formation, but did have notable external peri-anal edema. Given the non-diagnostic exam, a magnetic resonance imaging (MRI) was obtained and revealed extensive edema within the fibers of the external sphincter complex along with a 3.4cm fluid collection along the left perianal region. (Figure 1) The anal sphincter in its entirety was intact, without any defect or tear. The patient underwent pelvic floor physical therapy and was evaluated every 2-3 weeks thereafter, with only minimal symptom improvement over the first 4-6 weeks. At 8 weeks, we obtained an anal manometry study that showed a weak anal sphincter tone, with a mean resting pressure of 40mmHg and maximum squeeze pressure of 76mmHg. His recto-anal inhibitory reflex (RAIR) was intact, and was able to perform balloon expulsion. The patient continued physical therapy, and was noted to have regained fecal continence at 16 weeks.

Results/Outcome(s): Local anesthetic-induced myotoxicity is a known phenomenon, well described in several animal models. It is also known that the degree of injury is dose-dependent, and that injury is augmented with repetitive injections. All ester-amide local anesthetics have potential to cause myotoxicity, with bupivacaine being most likely. The addition of epinephrine and/or steroids augments this injury. The few cases that have been reported have been ophthalmic and orthopedic related surgeries that used local anesthetic to obtain a continuous nerve block. In this report, we present a unique incidence of local anesthetic-induced fecal incontinence secondary to myotoxicity.

Conclusions/Discussion: Using local anesthetic is a common approach used by colorectal surgeons for ano-rectal treatments. Though generally known to be safe, surgeons should be aware of the risks associated with this approach as well as knowledge of complication management.

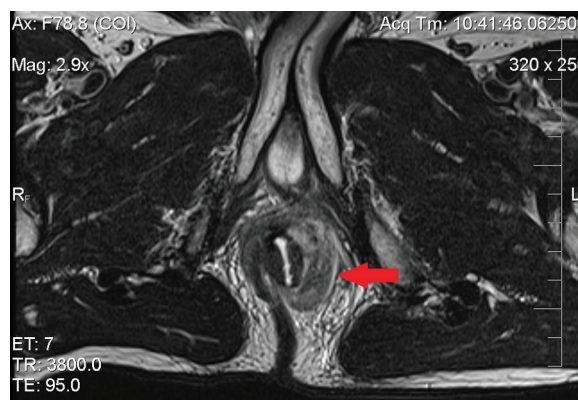


Figure 1. Magnetic Resonance Imaging (MRI). Cross-sectional imaging of the anal sphincter complex. Extensive edema within the fibers of the external sphincter complex along with a 3.4cm fluid collection along the left perianal region (arrowhead).

EVALUATION OF PRACTICE PATTERNS OF CHEMODENERVATION FOR CHRONIC ANAL FISSURE.

P127

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Purpose/Background: Chemodenervation of the internal anal sphincter with botulinum toxin has become a commonly accepted treatment for the treatment of anal fissures after failure of medical management. While widely accepted and utilized, there are no defined guidelines regarding chemodenervation technique, including the amount of botulinum toxin used, the appropriate dilution factor, the location of the injection, or when to offer a second injection if necessary. Several small single institution studies report reliable success treating anal fissures using botulinum toxin; however, the techniques described vary widely when reported. In an effort to understand the variability in the technique of this procedure, we sought to identify the practice patterns of the Young Surgeons Committee of the American Society of Colon & Rectal Surgeons.

Methods/Interventions: IRB approval was obtained by Rush University Medical Center. A 22 question anonymous survey was developed and distributed to the active members of the Young Surgeons Committee of the American Society of Colon & Rectal Surgeons. Descriptive statistics were calculated using Microsoft Excel.

Results/Outcome(s): A total of 34 surveys were distributed via email to the active members of the Young Surgeons Committee; 23 members responded (68%). Surgeons completed their colorectal fellowships between 2008 and 2019. Of the 23 surgeons, 21 performed chemodenervation (91%); the practice patterns of these individuals were analyzed. A majority practiced in a university academic environment (67%, n=14) with the remainder practicing within non-academic centers. About half of the surgeons (48%, n=10) reported one-to two-thirds of their practice being comprised of anorectal patients and most reported performing between 0-15 chemodenervation procedures (85%, n=18) and 0-15 lateral internal sphincterotomies per year (91%, n=19). Only 2 surgeons reported offering chemodenervation only to women, with a majority reporting that gender did not play a role in their decision making. All responding surgeons reported recommending a high fiber diet and topical medications as the first line treatment. Over half of surgeons attempted medical management for 2 months prior to offering chemodenervation (n=11). When patients failed medical management, a majority of surgeons offer chemodenervation but discussed sphincterotomy (62%, n=14), two (10%) surgeons only offer chemodenervation, 4 (19%) surgeons offer sphincterotomy but discuss chemodenervation, and one surgeon discussed other surgical options. Over half

of surgeons (57%, n=14) performed the procedure in the operating room only, with 3 performing it in the office only, and 4 performing in either the office or operating room depending on patient tolerance. Of those that only performed the procedure in the operating room, 8 (57%) surgeons reported not having access to the medication in the clinic setting. Most surgeons (71%, n=15) reconstituted 100 units of botulinum toxin, 3 reconstituted 50 units, and 1 did not know how many units. Three surgeons did not know the volume that was used to reconstitute the medication and the range was 1-10 mL of saline. One surgeon used lidocaine to dilute the medication. The most common methods of injection were either 4 injections in 4 quadrants (38%, n=8) or 2 injections (38%, n=8) in various locations. Most (76%) surgeons injected all of the units that were reconstituted, with 11 injecting a total of 100 units and 7 surgeons injecting a total of 50 units. The injection was performed into the internal anal sphincter by 12 surgeons (57%) and into the intersphincteric groove by 7 surgeons (33%). Eleven surgeons (52%) offered a second injection if the first injection was not successful in resolving symptoms. A majority of surgeons (n=15; 71%) believed that this procedure was efficacious for treating anal fissure symptoms in 33-66% of patients.

Conclusions/Discussion: The majority of Young Surgeons Committee members offer chemodenervation to patients despite their belief that the procedure is not highly efficacious. This study further demonstrates high technical variability in botulinum toxin injection among surgeons. It is possible that one of the reasons for the relatively low success rate of this procedure is the lack of consensus of the technique. This study validates the need for further evaluation of this treatment and development of guidelines for its performance.

LAPAROSCOPIC SIGMOID COLECTOMY FOR A URETEROCOLIC FISTULA SECONDARY TO DIVERTICULITIS: A CASE REPORT.

P128

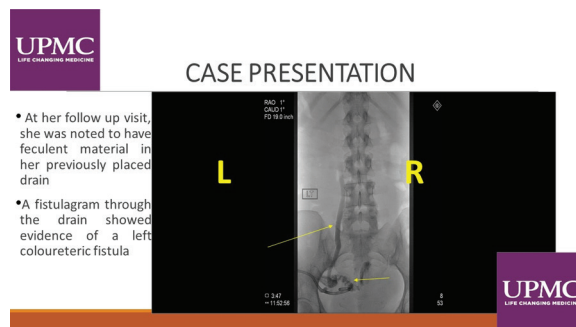
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Purpose/Background: It is well known that diverticulitis can lead to the development of several types of fistulas (colovesicular, colovaginal etc...). A ureterocolic fistula is a rare complication of diverticulitis. Although case reports exist outlining the etiology and management of such fistulas^{1,2}, there are no reports describing the laparoscopic approach to this complex disease. We present the case of a 45 year old female who developed a ureterocolic fistula from diverticulitis which was subsequently treated by a laproscopic sigmoid colectomy. We discuss the preoperative evaluation, operative steps, and postoperative outcomes and literature review for this rare complication of diverticulitis.

Methods/Interventions: The patient is a 45 year old female who present to our emergency department (ED) complaining of left lower quadrant and left flank pain. She had originally been treated several days prior to presentation for a urinary tract infection but returned to the ED with these new symptoms. Computed tomography (CT) of the abdomen and pelvis demonstrated acute uncomplicated diverticulitis for which she was admitted to the hospital and treated conservatively. On hospital day 4 she was noted to have an increasing white blood cell count and worsening pain so a repeat CT was performed. This demonstrated an 8 centimeter (cm) abscess in the left pelvis which was drained percutaneously. She recovered well and was discharged home with the drain. At her follow up visit, she complained of recurrent pain and the drainage from her catheter was feculent. A contrast study through the drain demonstrated contrast in both the sigmoid colon as well as the left ureter consistent with a ureterocolic fistula. Urology was consulted and emergently placed bilateral ureteral stents. The drain was kept in place and several weeks later she underwent a colonoscopy which was significant for diverticulosis with mass lesions. She then underwent a laparoscopic sigmoidectomy with take down of her ureterocolic fistula and primary anastomosis.

Results/Outcome(s): Her postoperative course was uneventful. She had return of bowel function on on postoperative day 3. Her foley catheter and a Jackson-Pratt drain which had been left in the pelvis were removed on postoperative day 5 and she was discharged to home. A follow up retrograde pyelogram showed complete resolution of the fistula without leak or stricture from the left ureter. The left ureteral stent was removed at that time.

Conclusions/Discussion: The laparoscopic approach to complex diverticular fistulas, including ureterocolic fistulas can be accomplished by following some basic surgical principles for diverticulitis. A thorough preoperative work up including CT and colonoscopy is essential to operative success. Prior to resection, it is critical to ensure all inflammation and sepsis has been controlled and are at a minimum. This often means waiting 6 to 8 weeks after an attack before proceeding to resection. We liberally use ureteral catheters for complex diverticular disease and find it helpful. Starting the dissection away from the inflammation and using a medial to lateral approach can aid in a safe dissection. Lastly, isolating the fistula completely and circumferentially prior to division helps minimize inadvertent injury to adjacent structures. In conclusion, the laparoscopic approach to diverticular fistulas is preferred but requires thorough preoperative evaluation and advanced laparoscopic skills to be performed safely. **REFERENCES:** 1.) Int J Colorectal Dis. 2014 Mar; 29(3):417-8 2.) Am Surg. 1994 Nov;60(11):832-5.



PATIENT AGE SHOULD NOT DETERMINE ELECTIVE RESECTION FOR ACUTE DIVERTICULITIS.

P129

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Purpose/Background: Acute diverticulitis among young patients has historically been associated with worse clinical outcomes. As a result, patients < 50 years of age (LF) have undergone elective colon resection during initial hospital admission to prevent recurrence of the disease and frequent readmissions whereas patients \geq 50 years of age (GF) were treated conservatively. However, newer data suggests that patient's age < 50 years does not increase the risk for worse clinical outcomes and surgery can be avoided. Therefore, the patient's age and the need for elective colon resection for acute diverticulitis remain controversial. The American Society of Colon and Rectal Surgeons provide a Level C recommendation for not performing elective resection in patients LF after their initial admission for acute diverticulitis. The purpose of this study was to compare the age groups of LF and GF and determine whether LF patients were admitted with more virulent disease based on Hinchey classification (HC) and if they had a higher readmission rate for recurrent disease.

Methods/Interventions: Patients with acute diverticulitis from 2005-2015 at a single institute were retrospectively reviewed. Demographics, HC, readmission rate and outcome were recorded. Patients were divided into two age groups (LF vs. GF) with initial admission HC, elective colon resection rate, hospital length of stay (HLOS), and mortality were compared. Readmission rate for recurrence of disease and subsequent colon resection were also analyzed. Statistical analysis was performed with using Mann-Whitney U and 2x2 contingency tests. Data were reported as median with interquartile range (IQR) or total number with percentage. Significance was defined as $p < 0.05$.

Results/Outcome(s): 880 adult patients (age \geq 18 years) with 981 admissions for acute diverticulitis were identified over the 10 year period. Of these, 266 (30%) were LF and 614 (70%) were GF. 795 (90%) patients had one admission and 85 (10%) patients had multiple

admissions for acute diverticulitis. Table 1 shows there was no significant difference between the two age groups for initial admission HC, elective colon resection, readmission rate, readmission colon resection or in hospital mortality. HLOS was significantly shorter in the LF patients. A total of 90 (10%) patients underwent emergent surgical resection with 78 (87%) during first admission and only 12 (13%) during a readmission (87% vs. 12%, $p=0.0001$).

Conclusions/Discussion: There is no difference in initial admission HC, readmission rate, or in hospital mortality for patients with acute diverticulitis regardless of age (LF vs GF). Age < 50 years should not be used to plan elective resection during the initial admission for acute diverticulitis.

MODIFIED VAN ASSCHE MRI-BASED SCORE FOR ASSESSING CLINICAL STATUS OF ANAL FISTULA.

P130

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Purpose/Background: The modified Van Assche MRI-based score was a feasible score system to assess the behavior for anal fistulizing Crohn's disease. The purpose was to apply this score to anal fistulas (AFs), assessing associations with clinical status of AFs.

Methods/Interventions: All patients with AF who underwent contrast-enhanced pelvic MRI and surgery between January 2011 and December 2016 were included. The score was retrospectively assessed for pre-surgical and 1, 3, and 6 month post-surgical time points. Univariate and multivariate analyses of the risk factors for AF recurrence were performed.

Results/Outcome(s): A total of 104 patients were retrospectively analyzed. Twelve (11.5%) patients developed AF recurrence. The patients' preoperative clinical statuses were classified into three grades: 52 (50.0%) were grade A, 31 (29.8%) grade B, and 21 (20.2%) grade C. The

preoperative MRI-based score was significantly correlated with preoperative clinical status score (Pearson correlation = 0.547, $P<0.001$). The three grades of preoperative clinical status showed tendencies for the MRI-based score to be reduced with the difference being significant ($F=23.303$, $P<0.001$). AF recurrence had a decreasing course of MRI-based score to the 1-month post-surgery timepoint, which changed to a gradual increase from then on ($F=60.863$, $P=0.000$). Long duration of disease, prior interventions, and high MRI-based score were independent risk factors for AF recurrence.

Conclusions/Discussion: The MRI-based score objectively presents the clinical status and disease activity of AFs, with a high score being associated with severe clinical status and long recovery time.

CURRENT US PREOPERATIVE BOWEL PREPARATION TRENDS: A 2018 SURVEY OF THE AMERICAN SOCIETY OF COLON AND RECTAL SURGEONS MEMBERS.

P131

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Purpose/Background: To assess the current trends of ASCRS members in the US regarding bowel preparation prior to colorectal surgery, and compare practices across US regions. The effect of an oral antibiotic preparation prior to colorectal surgery was first examined and exalted in the 1973 Nichols study. Since this commencement enthusiasm for the oral antibiotic regimen has waxed and waned, which has been a reflection of the literature focused on this topic over the past forty years. Polling colorectal surgeons to define current practices has been performed at intervals throughout the years, and has overall demonstrated a trend of decline. The most recent publication surveying US practices was in 2010, which reported a minority 36% use of oral antibiotics prior to elective colorectal surgery; a marked downtrend from

P129 LF vs GF: Comparison of Age with Initial Admission HC and Outcome

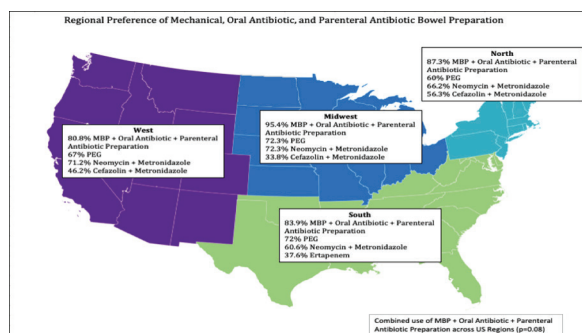
	LF	GF	<i>p</i>
Patients (n)	266 (30%)	614 (70%)	-
Age (years)	42 (36-46)	65 (57-74)	-
HC I	250 (96%)	540 (91%)	0.7
HC II	8 (3%)	40 (6%)	0.1
HC III	4 (2%)	20 (3%)	0.5
HC IV	0 (0%)	4 (1%)	1.0
Initial Resection	4 (6%)	61 (10%)	0.1
Initial HLOS (days)	4.5 (3-5)	5.6 (3-6)	0.02
Readmission Rate	24 (9%)	68 (11%)	0.4
Subsequent Resection	8 (3%)	7 (1%)	0.05
Hospital Mortality	0 (0%)	5 (0.8%)	0.4

the 88% use described in 1990. Since this last survey, the colorectal community has performed considerable research examining the benefit of oral antibiotic and mechanical bowel preparation. We aim to assess the current use of oral antibiotics prior to colorectal surgery in the US, and evaluate how practice trends have developed in response to current recommendations in the literature.

Methods/Interventions: An electronic survey was created and distributed to US colorectal surgeons to evaluate current opinions and practice trends of 359 ASCRS members. A review of recent literature pertaining to preoperative bowel practices and outcomes was performed to compare results of the survey.

Results/Outcome(s): 83.2% of respondents routinely use preoperative oral antibiotics. 98.6% routinely use a mechanical bowel preparation. The use of a combination of parenteral antibiotics, oral antibiotics, and mechanical bowel preparation is reported by 79.3%. The most commonly employed oral antibiotic regimen is neomycin and metronidazole. The most common mechanical bowel preparation solution reported is polyethylene glycol. The most common parenteral antibiotic regimen used is cefazolin and metronidazole. There was no statistically significant difference in this practice when comparing US regions ($p=0.08$), board certified status ($p=0.23$), or practice settings ($p=0.09$ to $p=0.71$).

Conclusions/Discussion: The majority of colorectal surgeons employ a combination of oral antibiotics, mechanical bowel preparation and parenteral antibiotics prior to colorectal surgery. This is consistent across US regions, despite board certification status or practice setting, and is reflective of current recommendations based on recent literature.



Comparison of preoperative bowel preparation practices across US regions

MINIMALLY INVASIVE ROBOTIC EXTENDED CECAL WEDGE RESECTION FOR BENIGN CECAL/ PROXIMAL ASCENDING COLON POLYPS.

P132

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Purpose/Background: Majority of patients with Cecal or very proximal ascending colon Polyps who are referred for surgery end up with a R hemicolectomy or Ileocectomy. Removal of the valve could aggravate patient's Bowel frequency & therefore life quality. Also the creation of Anastomosis has its own risks of leak, stricture & bleeding. With technological progress in articulated & tactile Robotic instruments & stapler, majority of the cecum can be removed minimally invasively without endangering the ileocecal valve.

Methods/Interventions: Settings: cases were performed by single colon & Rectal surgeon in Two community hospitals using da Vinci. Patients: We collected data on all patients referred with benign cecal, proximal, mid & distal ascending colon polyps. Method: Selection criteria for wedge resection were initial path report, careful review of endoscopic views, features, size & location of polyp related to ileocecal valve & appendiceal orifice. Main outcome measures: Leak, infection, bleeding, obstruction, Ileus, polyp recurrence, post-OP Pain hospital stay, return to work.

Results/Outcome(s): Forty three patients were identified from Jan. 2015 who underwent R sided Robotic Surgery for Benign lesions. Twenty three patients with more distal ascending colon or larger polyps who underwent Robotic resection with intracorporeal Anastomosis were used as the comparison group. Twenty patients with Cecal or proximal ascending colon polyps underwent an extended/ wedge resection of the cecum. Complication rate was zero in both groups. The Robotic wedge resection group had a shorter mean hospital stay of 1.1. Versus 2.8 days for Anastomotic group. All final surgical pathology were benign with clear margins in the wedge group, therefore no patient required second operation for missed malignancy. Return to work & post-Op Bowel habits was much better as expected for the wedge group. Endoscopic Tattooing of the polyp was very helpful for facilitating intra-Op decision making. No local recurrence or malignancy has been seen on 24 m follow ups. Limitations: selection bias, Robotic Surgery learning curve & small sample size

Conclusions/Discussion: Robotic extended/ wedge cecectomy with preservation of ileocecal valve for benign lesions is technically feasible & safe. Allowing to prevent an Anastomosis & sacrifice of Ileocecal valve. Carefully selected, tattooed Cecal benign lesions not amenable to endoscopic removal should be initially treated minimally invasively with wedge resection.

UTILITY OF ROUTINE INTERVAL ELECTIVE COLECTOMY FOLLOWING INITIAL EPISODE OF COMPLICATED DIVERTICULITIS: A DISEASE SIMULATION AND DECISION MODEL.

P133

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Purpose/Background: American Society of Colon and Rectal Surgeons guidelines recommend offering interval elective colectomy following an episode of complicated diverticulitis. However, emerging data suggests non-operative management is safe for many patients. The optimal algorithm for surgical management of diverticulitis should account for the rate of recurrence of diverticulitis, the morbidity associated with recurrences, operative safety in the elective and urgent contexts, and the costs and quality of life benefits associated with various management approaches. We constructed a decision model to assess the utility of routine interval elective colectomy following an initial episode of complicated diverticulitis.

Methods/Interventions: We built a hybrid state-transition disease simulation model with probabilistic and discrete-events nodes. Agent-based simulation was used to model interaction between patients and surgeons. We compare two strategies: (1) routine elective colectomy and (2) a trial of non-operative management with surgery in the event of recurrent complicated diverticulitis or multiple recurrences of uncomplicated diverticulitis. In both strategies, emergency surgery was provided in the event of diverticular peritonitis and for elective stoma reversal when applicable. For each strategy, we used simulated cohorts of 100,000 American 55-year-olds over a ten-year time horizon. State utilities were assigned to the non-operative states and post-operative states with or without stoma. We used one-time quality of life decrements to penalize operative complications and recurrent acute diverticulitis. Utilities were discounted at a 3% annual rate. Input parameters were obtained from published literature.

Results/Outcome(s): In the base-case scenario, routine operative intervention resulted in a gain of 4.4 quality-adjusted life months per patient. However, results were highly sensitive to small changes in utilities assigned to the non-operative and post-operative states. In particular, when the quality of life associated with non-operative management was assumed to equal quality of life associated to the post-colectomy state, the utility of routine surgery became negligible. Model results were robust to one-way sensitivity analysis of other input parameters.

Conclusions/Discussion: This model suggests the utility of interval elective colectomy following a first attack of complicated diverticulitis depends critically on the difference in quality of life between those who undergo elective colectomy versus those who are managed non-operatively. We plan to refine and extend the model to

assess more sophisticated management algorithms and to include analysis of cost-effectiveness.

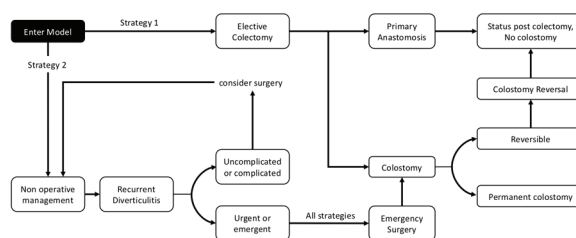


Fig 1. Simplified, schematic representation of state transition model and management strategies.

WHAT IS THE IMPACT OF DIVERTICULAR ABSCESS DRAINAGE ON DECISION TO OFFER SURGERY?

P134

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Purpose/Background: Approximately 15-20% of diverticulitis cases are complicated by abscess formation. Percutaneous drainage has long been utilized to avoid urgent operation. There is scant data describing differences in outcomes based on abscess characteristics.

Methods/Interventions: All patients who underwent percutaneous drainage of a diverticular abscess at one of five collaborating hospitals (3 community, 2 academic) from October 2007 to September 2016 were studied. Abscesses were characterized on radiographic appearance and subdivided into 5 grades based on complexity. Clinical outcomes after drainage were evaluated. A logistic regression model was created to identify factors contributing to the decision to undergo elective surgery after drainage.

Results/Outcome(s): There was significant hospital variation in the percentage of diverticulitis admissions that resulted in drain placement (3-10%). A total of 344 patients undergoing drainage of diverticular abscess were identified. The majority of patients (68%) were defined as Grade 3 – abscess >5cm with intervening bowel loops, easily avoided. Complications of drain placement were rare, occurring in 0.9% of cases. There were no significant differences in outcomes at community vs academic hospitals, though academic hospitals seemed more aggressive at draining patients with localized peritonitis (29% vs 19%, P<.05). After drainage, 51% of patients went on to elective surgery. Factors contributing to likelihood of elective surgery included female sex, 3+ prior episodes of diverticulitis, and >28 days until drain removal.

Conclusions/Discussion: Abscesses can be subdivided based on radiographic and drainage complexity. Abscess complexity does not seem to predict decision for surgery, which is better predicted by number of prior episodes and time to drain removal.

A CASE OF ENDOSCOPIC BALLOON DILATION OF ILEOCECAL VALVE STRICTURE.

P135

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Purpose/Background: Approximately 1.3% or 3 million people in the United States are diagnosed with inflammatory bowel disease (Crohn's disease (CD) or ulcerative colitis). Strictureing CD occurs in approximately 20% of patients with small bowel CD. Treatment options include strictureplasty or resection to relieve obstructive symptoms, however, these come with their own risks and potential problems. Here we present a successful endoscopic balloon dilation of an ileocecal valve stricture as an alternative to surgery.

Methods/Interventions: The patient is a 22 year-old male with a history of strictureing CD, who presented with worsening abdominal pain. Patient was diagnosed with CD at age 11, had one strictureplasty and three small bowel resections for recurrent strictures. He had previously been treated with 6-MP, infliximab, adalimumab, with secondary loss of response, currently being treated with ustekinumab. The patient underwent colonoscopy, which noted an ileocecal valve (ICV) stenosis and stricture (Image 1). Patient underwent swallowing of a trial capsule for virtual colonoscopy that subsequently became stuck at the ICV. High dose, short course steroids were trialed, but unsuccessful.

Results/Outcome(s): Repeat colonoscopy was performed showing a stenosis and 1-cm stricture at the ICV. A through the scope (TTS) dilator was passed; dilation with a 10-11-12mm colonic balloon dilator was performed under fluoroscopic guidance and trial capsule retrieved. Patient recovered well, pain improved and patient was able to stop opioid pain medications.

Conclusions/Discussion: Surgery for strictures and stenosis in CD is common and successful, however, the recurrent nature of strictures causes a potential concern for malnutrition and short gut syndrome with multiple surgeries. Endoscopic balloon dilation of an ileocecal valve stricture is a safe alternative option for treatment.

Image 1: Ileocecal valve moderate inflammation and stricture



VARIABILITY IN PATHOLOGY REPORTING OF ULCERATIVE COLITIS COLECTOMY SPECIMENS REVEAL A NEED FOR STANDARDIZED REPORTING.

P136

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Purpose/Background: Ileal pouch-anal anastomosis (IPAA) is the procedure of choice for restoration of intestinal continuity following proctocolectomy for ulcerative colitis (UC). While overall patient reported outcomes are good, adverse outcomes including pouchitis and *denovo* Crohn's disease are not uncommon. Various pathologic features of the resected colorectum are considered potential risk factors for the development of these adverse outcomes. Little is known however regarding the consistency of these prognostic features in postoperative histopathology reports. The aim of this study was to determine the congruency of reporting critically important histopathologic variables at the time of subtotal colectomy and proctocolectomy for UC.

Methods/Interventions: We performed a retrospective review of most recent subtotal colectomy and proctocolectomy surgical specimen pathology reports at two tertiary IBD referral centers. Operative reports were reviewed and data on surgical indication collected. Patients who underwent subtotal colectomy or proctocolectomy for ulcerative colitis or indeterminate colitis were included in data analysis. Patients undergoing subtotal colectomy for ischemic or infectious or Crohn's colitis were excluded. Data extracted from the pathology reports included gross and microscopic histopathology characteristics deemed important risk factors for adverse outcomes after IPAA. The frequencies of histopathologic reporting were compared between institutions with χ^2 test, using JMP Pro 13 (SAS Institute Inc).

Results/Outcome(s): The total number of reports included in analysis was 560, 261 from institution A and 299 from institution B. There was large variability in the reporting of gross and microscopic histopathology findings across patients within each institution (Table 1). There were also statistically significant differences in histopathology reporting between the two institutions (Table 1). In particular, reporting of all five of the gross histopathology characteristics and 11 out of 16 microscopic characteristics differed significantly between the institutions (p-values <0.05).

Conclusions/Discussion: We found significant disparity in reporting of critically important histopathologic variables at the time of subtotal colectomy and proctocolectomy for UC. This was true both within and between institutions. This highlights the need for development of structured checklists to produce standardized clinical documentation to enable the accurate study of risk factors associated with adverse outcomes after IPAA.

SHORT AND LONG-TERM OUTCOMES OF ONE-STAGE STAPLED ILEAL POUCH ANAL ANASTOMOSIS FOR ULCERATIVE COLITIS.

P137

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Purpose/Background: Total proctocolectomy with construction of an ileal pouch anal anastomosis (IPAA) is standard procedure for ulcerative colitis (UC) patients. Controversy exists regarding the safety for one-stage IPAA because of the possibility of increased septic complications and mortality. There are few reports about long term outcome of IPAA. Our institution has always introduced one-stage IPAA for the patients who were suitable for this procedure. This study was designed to evaluate the short and long term outcomes in patients with UC who underwent one-stage IPAA.

Methods/Interventions: A series of 1015 consecutive UC patients who underwent stapled IPAA without mucosectomy was retrospectively studied. Of those patients, one-stage stapled IPAA was performed in 735 patients (OS group) and two-stage was performed in 280 patients (TS group). In patients with two-stage stapled IPAA, subtotal colectomy with ileostomy is performed for first

stage surgery followed by proctectomy and stapled IPAA without ileostomy is second stage surgery. One-stage stapled IPAA was performed for the patients with good general condition, exclusion of Crohn's disease in preoperative diagnosis, without perforation and toxic megacolon, and deep ulcer in anal canal. We compared the morbidity rates and pouch survival rates.

Results/Outcome(s): No significant differences were found between the OS group and TS group regarding the gender, median age at onset of UC, median age at IPAA. The rates of severe and fulminant colitis were significantly lower and total prednisolone dose was higher in OS groups. The anastomotic leakage rate (including radiological leakage without clinical symptom) is significantly higher in OS group ($P=0.002$), but no significant difference was found regarding the rate of re-operation with ileostomy. The rates of small bowel obstruction, superficial surgical site infection were significantly higher in TS group ($P=0.019, 0.001$). Pouch survival rate at 5, 10, 15, 20 years were 99.7%, 99.2%, 97.5%, 96.6% in OS group, 98.4%, 97.4%, 97.4%, 97.4% in TS group (No differences, $P=0.847$).

Conclusions/Discussion: The long term outcome of one-stage IPAA are good and not inferior to that of two-stage IPAA. One-stage IPAA is alternative procedure for selected patients with ulcerative colitis.

P136 Comparison of critical gross and microscopic histopathology descriptors present in colectomy pathology reports across two institutions.

Histopathology characteristics	Institution A	Institution B	p-value
	Gross, n (%)		
Continuous/discontinuous inflammation	248 (95)	56 (19)	<0.0001
Disease extent	246 (94)	139 (46)	<0.0001
Cecal patch	19 (7)	5 (2)	0.0008
Stenosis	9 (3)	0	0.0002
Cobblestone appearance	10 (4)	40 (13)	<0.0001
	Microscopic, n (%)		
Pyloric gland metaplasia	1 (<1)	39 (13)	<0.0001
Paneth cell metaplasia	0	45 (15)	<0.0001
Depth of inflammation	204 (78)	91 (30)	<0.0001
Terminal ileal inflammation	111 (43)	237 (79)	<0.0001
Granulomas	142 (54)	248 (83)	<0.0001
Basal plasmacytosis	0	26 (9)	<0.0001
Crypt abscesses	131 (50)	51 (17)	<0.0001
Neuronal hyperplasia	1 (<1)	6 (2)	0.0671
Fissures	17 (7)	42 (14)	0.0032
Sinuses/fistulas	5 (2)	142 (47)	<0.0001
Submucosal edema	1 (<1)	4 (1)	0.2123
Submucosal lymphoid aggregates	8 (3)	14 (5)	0.3219
Transmural lymphoid aggregates	12 (5)	21 (7)	0.2204
Mural/muscular hypertrophy	103 (39)	17 (6)	<0.0001
Muscularis propria inflammation	6 (2)	20 (7)	0.0111
Mucin depletion	0	0	--

REOPERATION SURGERY FOLLOWING IPAA: IS THERE A ROLE FOR LAPAROSCOPY?

P138

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Purpose/Background: Restorative proctocolectomy with ileal J pouch anal anastomosis (IPAA) has become the standard of care for patients with mucosal ulcerative colitis (MUC) and Familial Adenomatous Polyposis (FAP). Unfortunately, some patients require reoperation, including pouch revision, advancement, or excision. Reoperative procedures are technically demanding and are usually performed only by experienced colorectal surgeons in a small number of referral centers. There are a paucity of data regarding the feasibility, safety, and outcomes of laparoscopic reoperative IPAA surgery. We present our series of transabdominal reoperative IPAA surgeries, with an emphasis on surgical approaches and their respective outcomes.

Methods/Interventions: A retrospective analysis of an IRB-approved prospective database was performed of all patients who underwent transabdominal reoperative IPAA surgery from 2010-2018. Patient demographics as well as operative reports were reviewed to classify the type of reoperative pouch excision, revision, or advancement and to further classify as laparoscopic, laparoscopic converted to open, or open surgery. The postoperative course was reviewed with statistical univariate and multivariate analyses.

Results/Outcome(s): A total of 76 patients met the inclusion criteria. Twelve patients had laparoscopic redo IPAA surgery and 64 had open surgery, including 7 who were converted from laparoscopic to open, for an overall 63% laparoscopy success rate. Prior laparoscopic approach was the only significant preoperative factor in attempting laparoscopic reoperative IPAA surgery (Table 1). Length of stay (LOS) for patients who underwent laparoscopic surgery was significantly lower (5.5 vs 9.7 days, $p < 0.001$) as were wound complication (0% vs 18%, $p < 0.001$) and abdominal abscess (0% vs 17%, $p < 0.001$). The open surgeries were performed by 5 colorectal surgeons at our

institution while the laparoscopic approach was performed only by the senior author. There was no significant difference in overall complications, readmission, reoperation, or mortality.

Conclusions/Discussion: Reoperative laparoscopic IPAA is both feasible and safe and has clear benefits compared to an open approach in terms of LOS and wound and abscess complications. However, this approach needs to be undertaken only by very experienced, high volume laparoscopic IPAA surgeons.

ASSOCIATIONS BETWEEN MULTIPLE IMMUNOSUPPRESSIVE TREATMENTS BEFORE SURGERY AND SURGICAL MORBIDITY IN PATIENTS WITH ULCERATIVE COLITIS DURING THE ERA OF BIOLOGICS.

P139

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Purpose/Background: Immunomodulators or biologics, with the exception of corticosteroids, do not appear to be risk factors for postoperative infectious complications of ulcerative colitis (UC). Recently, many immunosuppressive therapies including some biologics are used mainly to treat UC, and many patients are on multi-agent immunosuppressive therapy at the time of surgery. Therefore, we evaluated the influence of preoperative multiple immunosuppressive agents on the occurrence of surgical site infection (SSI) in UC during the era of biologics.

Methods/Interventions: We reviewed surveillance data from 301 patients who underwent restorative proctocolectomy between January 2015 and April 2018. The incidences of SSI and possible risk factors among patients receiving different immunosuppressive therapies were compared and analysed.

Results/Outcome(s): The incidence of incisional SSI (wound infection) was 6.6%, and that of organ/space SSI (abdominal/pelvic sepsis) was 7.0%. Prednisolone (PSL),

P138 Table 1. Pre-operative demographic comparison between lap and open approach

	Laparoscopic	Open	P
Gender (Female/Male)	3/9	29/36	0.7
Mean Age (Range)	44.9 (14-72)	48.1 (25-79)	0.48
Mean Body mass index (BMI), kg/m ² (Range)	23.45 (18-31.6)	24.12 (17-41.5)	0.85
Prior surgery approach (n,%):	6/12 (50)	53/64 (82)	0.025
Laparoscopic			
Type of procedure (n,%)	8/12(67%)	44/64(68%)	1.0
Excision	2/12(16%)	9/64(14%)	1.0
Advancement	2/12(16%)	11/64(17%)	1.0
Redo			

carcineurin inhibitors (CNIs), and anti-TNF- α antibodies were administered to 117/301 (38.9%), 119/301 (39.5%), and 146/301 (48.5%) patients, respectively. Doses of PSL were significantly decreased because of the recent shift towards the use of biologics. The median total amount of PSL administered and preoperative PSL dose were 3,000 mg and 10 mg, respectively. Numbers of patients who are treated with none agents or thiopurine alone, with one agent, with two agents, and with three agents were 66(21.9%), 107(35.5%), 111(36.9%), and 17(5.6%), respectively. Age at initial surgery was significantly lower in patients with three agents, including PSL, CNIs, and anti-TNF- α antibody ($p < 0.01$). Urgent/emergent surgery was significantly less common in patients with no or one agent(s) ($p = 0.04$). Patients with no agents or AZA/6-MP administration alone had many more surgical indications of cancer/dysplasia ($p < 0.01$). Severe or fulminant disease was significantly lower in patients with no agents or thiopurine alone than in other groups ($p < 0.01$). The kinds and numbers of immunosuppressive agents did not significantly correlate with each incidence. Preoperative serum albumin < 3.4 g/dL (odds ratio: OR, 5.0), surgical indication of cancer/dysplasia (OR, 8.4), and perioperative blood transfusion (OR, 4.6) were shown to be independent risk factors for incisional SSI, whereas only perioperative blood transfusion (OR, 3.4) was identified as an independent risk factor for organ/space SSI.

Conclusions/Discussion: Although no correlation between preoperative immunosuppressive therapies was found, we should mention selection bias for treatment before surgery. However, biologics, calcineurin inhibitors, and thiopurines did not affect surgical morbidity in UC.

ACTINOMYCOSIS OF THE APPENDIX MIMICKING CECAL TUMOR: A CASE REPORT.

P140

I. Cho

Daegu, Korea (the Republic of)

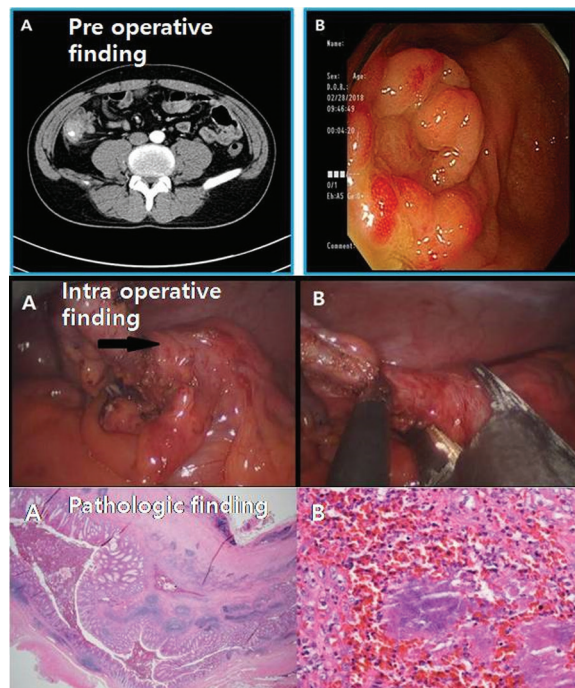
Purpose/Background: Actinomycosis is a chronic, suppurative, and granulomatous disease caused by an anaerobic Gram-positive bacterium, *Actinomyces israelii*. There are several reports suggesting infiltrative mass like nature of actinomycosis which is misunderstood as tumor. We present one case with this kind of nature

Methods/Interventions: A 39 year old male was found mass like lesion in colonoscopy which was undergone for healthcare screening. He was performed laparoscopic single port cecectomy according as cecal cancer.

Results/Outcome(s): Final biopsy showed actinomycosis and he was prescribed with antibiotics and showed no recurrence in follow up CT scan.

Conclusions/Discussion: *Actinomyces israelii* is the most common cause of the disease. These organisms are indigenously in the oral cavity, gastrointestinal tract, and genital

tract, with opportunistic infection occurring when the mucosal barrier is broken, which leads to multiple abscess formation, fistula, or mass lesions. A strongly presumptive diagnosis can be made based on the finding of the classical sulphur granule either grossly in lesional material or microscopically on a hematoxylin and eosin slide. In medical treatment, all actinomyces species remain sensitive to most common antibiotics so the treatment of choice remains high dose antibiotic therapy for prolonged periods as the intense desmoplastic reaction associated with actinomycosis limiting drug penetration.



OPTIMAL SURGICAL APPROACH TO CROHN'S DISEASE PATIENTS WITH A COMPLEX FISTULA. LIGATION OF INTERSPHINCTERIC FISTULA TRACT (LIFT) OR RECTAL ADVANCEMENT FLAP (FLAP)?

P141

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Purpose/Background: Anal fistulas in Crohn's disease (CD) remains a challenge for patients and surgeons due to high rates of recurrence and lack of a standardized treatment approach. Ligation of the intersphincteric fistula tract (LIFT) and rectal advancement (FLAP) procedures are two repair options for anal fistula in CD. Yet comparative studies on these two techniques in CD are lacking. We sought to compare healing rates and outcomes in LIFT vs. FLAP in CD.

Methods/Interventions: A single center retrospective analysis was performed of all CD patients undergoing LIFT or FLAP by two colorectal surgeons between 2008

and 2018 identified through CPT and ICD chart review. Patient demographics, disease and fistula characteristics, operative factors, healing rates, recurrence, and outcome at final follow-up were compared. Fistula healing was defined as closure of all external wounds with cessation of drainage and pain. Procedure failure was defined as lack of closure of external wounds with persistent drainage or recurrent abscess at prior fistula or LIFT site within 6 months of surgery. Recurrence was defined as development of abscess/fistula at original site or LIFT site after initial closure of wounds > 6 months after surgery.

Results/Outcome(s): The study cohort included 60 patients undergoing LIFT (n=38) or FLAP (n=22). Patients undergoing LIFT were younger (35 yrs. vs. 43 yrs; $p=0.007$), more likely to have a seton at the time of repair (92% vs. 68%; $p=0.03$), less likely to have had prior repair attempts (34% vs. 68%; $p=0.02$), and less likely to have adjunctive procedures performed at the time of repair (5% vs. 36%; $p=0.003$) (Table). Most fistulas were transsphincteric in both groups (LIFT:68%, FLAP 59%). 29 (76%) LIFT procedures healed vs. 10 (45%) FLAP procedures ($p=0.02$). Recurrence occurred in 6 (16%) LIFT procedures vs. 5 (23%) FLAP procedures after initial healing of the fistula tract ($p=0.1$). At final follow-up of 27 (3-77) months for LIFT surgeries and 66 (4-192) months for FLAP surgeries ($p=0.003$), 22 (58%) LIFT patients and 8 (36%) FLAP patients had healed fistulas without drainage or seton ($p=0.2$). Only 3 (8%) LIFT and 2 (10%) FLAP patients required proctectomy or permanent fecal diversion at final follow-up. On multivariable analysis of fistula characteristics and operative factors LIFT was an independent predictor of fistula healing (hazard ratio 0.31); $p=0.04$.

Conclusions/Discussion: In this retrospective series of CD patients with anal fistula, LIFT resulted in higher initial fistula healing rates compared with FLAP without an impact on fecal diversion or proctectomy. Ultimate outcomes, however, remain poor, with over 1/3 of patients having a persistent fistula on long-term follow-up regardless of technique. Consideration of long-term seton drainage should be discussed with patients prior to offering either repair option.

MORTALITY AFTER SURGERY FOR IBD: WHY DO PATIENTS DIE?

P142

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Purpose/Background: Surgical IBD patients often have complex presentations with multiple risk factors such as immunosuppressive medications, malnutrition and anaemia, all of which may contribute independently to post-operative morbidity and mortality. Mortality after colorectal surgery in IBD is rare, occurring in 1% of most

series. Mortality after IBD surgery is not well-understood in terms of risk factors, and its rarity makes it exceptionally hard to study outside of big data analysis. Thus we aimed to define risk factors for mortality after surgery for IBD and predictors of mortality using a large cohort of patients in order to determine what can be done going forwards in order to reduce mortality.

Methods/Interventions: We analysed the National Surgical Quality Improvement Program Participant User File and Colectomy and Proctectomy Modules from 2012 - 2016. Patients were stratified into 2 groups based on the outcome of all-cause mortality within 30 days of surgery; ten ASA class 5 patients (mortality rate 20%) were excluded. Differences in baseline characteristics and post-operative comes short of mortality were assessed with univariate analysis. Multivariable logistic regression analysis was used to identify both preoperative risk factors and postoperative complications associated with mortality. Figures represent mean (standard deviation), frequency (proportion), or odds ratio (95% C.I.)

Results/Outcome(s): A total 9,296 patients from a 4-year period were analysed: 6,396 (69%) with Crohn's disease patients and 2900 (31%) with ulcerative colitis patients. The overall 30-day post-operative mortality was (0.60%). Patients who died had a longer preoperative hospital stay (8.9 ± 11 vs. 2.1 ± 8.8 , $P<0.0001$) and more post-operative complications (3.5 ± 2.0 vs. 0.4 ± 0.8 , $p<0.0001$). The mean number of days till death was 13 ± 8 days. In terms of baseline characteristics, on univariate analysis patients who died, compared to those who survived, were older (59.2 ± 15.3 vs. 41.7 ± 15.7 $p<0.0001$), and more likely to have ulcerative colitis (60% vs. 31%, $p<0.0001$) and weight loss weight loss (19.6% vs. 11.3%, $p=0.05$) but did not differ with regard to gender, body mass index, or proportion on steroids. Multivariate analysis of preoperative predictors of mortality included age >40 (OR 11.3 [4 - 31.6], $p<0.0001$) emergency surgery (OR 7.5 [4 - 14], $p<0.0001$), ulcerative colitis diagnosis (OR 2.9 [1.6 - 5.3], $p=0.0004$), preoperative transfusions (2.7 [1.32 - 5.7], $p=0.007$) and open surgery (OR 2.4 [1.3 - 4.7], $p=0.006$); steroids, anemia, weight loss and composite comorbidity were not independently associated with mortality. Patients who had 0, 1, 2, 3, 4, or 5 of these risk factors had an observed mortality rate of 0%, 0.18%, 0.67%, 2.8%, 8.3% and 29%, respectively ($p<0.0001$). Post-operative complications associated with mortality are shown in **Table 1**; of note anastomotic leak was not independently associate with mortality in this cohort.

Conclusions/Discussion: Among patients undergoing surgery for IBD, older patients with ulcerative colitis undergoing emergent surgery are at highest risk of mortality. This data suggests that we may be able to improve our mortality rates if we focus on timely surgical intervention in these clearly at-risk patients.

P141 Table 1: Preoperative characteristics, anal fistula anatomy, and outcomes of LIFT vs. FLAP in CD

	LIFT (n=38)	FLAP (n=22)	p-value
Patient and disease characteristics			
Gender F:M (%F)	22:16 (58)	12:10 (55)	1
Age at surgery (years)	35 (12-63)	43 (22-68)	.007
Preop medical therapy	26 (68)	12 (55)	0.4
Biologics	9 (23)	6 (27)	0.8
Immunomodulators	6 (16)	2 (9)	0.5
Antibiotics			
Disease location		6 (27)	0.07
Small bowel	2 (5)	7 (32)	
Ileocolic	18 (47)	9 (41)	
Colorectal	18 (47)		
Status post IPAA	6 (16)	3 (14)	1
Proctitis at time of surgery	21 (55)	6 (27)	0.06
Other anal/perianal disease	1 (3)	0	1
Ulcer	8 (21)	5 (23)	1
Anal stenosis	2 (5)	0	0.5
Osteomyelitis of coccyx			
Seton prior to repair	35 (92)	15 (68)	0.03
Duration of seton (months)	5 (2- 48)	11 (0-27)	0.003
Preop fecal diversion	10 (26)	9 (41)	0.3
Fistula anatomy & repair techniques			
Multiple fistula tracts	24 (63)	12 (55)	0.6
Branching tracts	6 (16)	9 (41)	0.06
Fistula anatomy	0	1 (5)	0.4
Intersphincteric	26 (68)	13 (59)	0.6
Transsphincteric	11 (29)	2 (9)	0.1
Anovaginal	0	3 (14)	0.045
Rectovaginal	1 (3)	3 (14)	0.1
Pouch-perineal			
Prior repair attempts	13 (34)	15 (68)	0.02
Adjunctive techniques	2 (5)	8 (36)	0.003
Glue	0	1 (5)	0.4
Anal fistula plug	0	5 (23)	0.005
Amniofill	2 (5)	0	0.5
Stem cells (adipose-derived)	0	2 (9)	0.1
Fistula and patient outcomes			
Outcome of repaired fistula	29 (76)	10 (45)	0.02
Healed	9 (24)	12 (55)	
Failed			
Recurrent fistula after healing	6 (16)	5 (23)	0.1
Time to recurrent fistula (mo)	11 (7-13)	14 (4-51)	1
Procedures after failure/recurrence	15 (39)	7 (32)	0.6
Anal fistula plug	0	1 (5)	0.4
Fistulotomy	5 (13)	1 (5)	0.4
LIFT	0	2 (9)	0.1
Draining seton	7 (18)	2 (9)	0.5
Cutting seton	2 (5)	1 (5)	1
Vaginal advancement flap	1 (3)	0	1
Postop Fecal Diversion	5 (13)	2 (9)	1
Outcome of patient at last follow-up		8 (36)	0.2
Healed & no drainage or setons	22 (58)	12 (55)	0.2
Draining fistulas remain	13 (34)	2 (9)	1.000
Primary fistula site	4 (11)	10 (45)	0.09
Other fistula sites	9 (24)	1 (5)	1
Fecal diversion	1 (3)	1 (5)	1
Proctectomy or Ileal pouch excision	2 (5)		
Duration of follow-up (months)	27 (3-77)	66 (4-192)	.003

RECURRENCE OF CLOSTRIDIUM DIFFICILE AND CYTOMEGALOVIRUS INFECTIONS IN PATIENTS WITH ULCERATIVE COLITIS WHO UNDERGO ILEAL POUCH-ANAL ANASTOMOSIS.

P143

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Purpose/Background: Patients with ulcerative colitis (UC) are at increased risk for infections such as Clostridium difficile and cytomegalovirus (CMV) colitis due to chronic immunosuppression, with recent reports demonstrating a significant increase in mortality in UC patients with C. difficile infections. However, the rate of C. difficile and CMV infections in patients who undergo ileal pouch-anal anastomosis (IPAA) for UC is not well characterized. Furthermore, the rate of C. difficile or CMV recurrence after IPAA and the need for C. difficile perioperative prophylaxis are also unclear. This study aims to determine the rate of C. difficile and CMV infections in patients who undergo IPAA for UC, the rate of C. difficile and CMV recurrences, and a possible association of C. difficile prophylaxis with recurrence. We also aim to determine if there is any association between C. difficile and CMV infections and mortality after IPAA.

Methods/Interventions: All patients with UC who underwent IPAA between 2001-2017 (MGH 7/2001-7/2017; BIDMC 12/2001-12/2016) at two tertiary referral centers were identified. History of C. difficile or CMV colitis prior to any surgery (stage 1 out of 2 – proctocolectomy and IPAA creation; or stage 1 or 2 out of 3 – abdominal colectomy with end ileostomy, or completion proctectomy and IPAA creation) was noted, as well as recurrence of C. difficile or CMV infection after IPAA. UC characteristics, perioperative C. difficile prophylaxis, and postoperative outcomes were also recorded. Patients with C. difficile and CMV were compared to those without either infection using t-tests and chi-squared tests.

Results/Outcome(s): A total of 633 patients with UC who underwent IPAA were identified, of whom 51 (8.1%) patients had C. difficile and 17 (2.7%) had CMV infections. Of the patients with C. difficile, 9.8% recurred

after IPAA, while 5.9% of the patients with CMV had recurrence after IPAA ($p>0.05$). There were no differences in age, sex, race, or BMI between patients with C. difficile or CMV and patients with neither infection (all $p>0.05$). There were no differences in use of steroids (55.9% vs 51.4%, $p=0.49$), anti-TNF agents (33.8% vs 30.0%, $p=0.53$), or other immunomodulators (35.3% vs 33.0%, $p=0.71$) between patients with and without C. difficile or CMV, nor was there any difference in indication for surgery (83.8% vs 83.5% medically refractory disease, $p=0.95$). Patients with C. difficile and CMV had ASA scores ≥ 3 (29.4% vs 19.7%, $p<0.0002$), and were more likely to undergo urgent surgery (58.8% vs 19.1%, $p<0.0002$) and 3-stage procedures (38.2% vs 19.9%, $p=0.001$). There were no differences in rates of abdominal sepsis or abscess (14.7% vs 12.7%, $p=0.66$), 90-day mortality (0% vs 0.4%, $p>0.05$), pouchitis (36.8% vs 45.0%, $p=0.21$), or return to stoma (7.4% vs 5.4%, $p=0.51$) between patients who did or did not have C. difficile or CMV. Focusing only on the 51 patients with history of C. difficile, 54.9% were steroid dependent at the time of their colectomy and 31.4% had an active C. difficile infection within 30 days of their colectomy. Approximately 45.1% were treated with IV metronidazole, 54.9% with PO metronidazole, 56.9% with PO vancomycin, 52.9% with antibiotics for >30 days, and 11.8% with fecal transplant, and 76.5% required inpatient admission for a C. difficile infection. While 44.7% of patients with no C. difficile recurrence received preoperative PO vancomycin for C. difficile prophylaxis, none of the patients who later recurred had received prophylaxis. Of the 17 patients with history of CMV infections, 35.3% were steroid dependent at the time of their colectomy. Approximately 82.4% of patients required inpatient admission for treatment of CMV colitis, with 70.1% of patients receiving IV ganciclovir and 64.7% PO valganciclovir, and 35.3% receiving antiviral therapy for >30 days.

Conclusions/Discussion: In our cohort of 633 patients with UC who underwent IPAA at our two tertiary referral centers, we found a substantial proportion had a history of C. difficile (8.1%) and CMV (2.7%) colitis. Rates of infectious recurrence after IPAA were higher in patients with C. difficile (9.8%) than CMV (5.9%). Independent of pre-operative IBD treatment, patients with C. difficile and CMV had higher rates of urgent and 3-stage

P142 Table 1

Variable	Odds ratio (95 % CI)	P- value
Cardiac Arrest	213 (49-921)	<0.0001
Shock	9.0 (3-27.2)	<0.0001
Re-intubation	6.5 (2.1-20)	0.001
Bleeding requiring transfusion	4.7 (2.1-10.5)	0.0002
Failure to wean	3.7 (1.11-12.3)	0.03
Pre-renal failure	4.6 (1.1-20)	0.04
Anastomotic leak	1.28 (0.3-5.4)	0.73

procedures when compared to patients without infection, but did not have higher rates of post-operative complications or 90-day mortality. Peri-operative prophylaxis for *C. difficile* in patients with previous history of *C. difficile* seems to eliminate post-operative recurrences, suggesting that patients with a history of *C. difficile* should receive targeted prophylaxis during future operations.

SURGICAL MANAGEMENT OF RECTOVAGINAL FISTULA IN CROHN'S DISEASE.

P144

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Purpose/Background: Rectovaginal fistulas in patients with Crohn's disease are challenging to manage and treatment options are medical therapy and surgery. Surgical treatment remains the best option to achieve permanent closure of the fistula and restore patients' quality of life. Varying procedures and success rates have been described

P143 Demographics of patients with ulcerative colitis who undergo IPAA, based on history of *C. difficile* and CMV infections.

Characteristic	No Cdiff or CMV (n=565)	Cdiff (n=51)	CMV (n=17)
Age >=30 years old	47.1%	52.9%	76.5%
Male Sex	56.2%	52.9%	70.6%
White Race	90.1%	86.3	76.5%
Charlson comorbidity score >=3	50.9%	56.5%	63.6%
BMI <=20	12.7%	23.9%	13.3%
ASA score >=3	19.7%	25.5%	41.1%
Prior abdominal surgery	24.7%	19.6%	17.6%
Active smoker	3.2%	1.9%	0.0%
Steroid use at time of first operation	51.4%	58.8%	47.0%
Anti-TNF agent use at time of first operation	30.0%	33.3%	35.3%
Other immunomodulator use at time of first operation	33.0%	37.6%	29.4%
Urgency of first operation	.	.	.
Urgent	17.1%	49.1%	64.7%
Emergent	2.0%	5.8%	5.8%
Indication for operation	.	.	.
Medically refractory ulcerative colitis	83.5%	82.4%	88.2%
Dysplasia or cancer	12.8%	5.8%	5.8%
Toxic megacolon or perforation	3.3%	11.7%	11.7%
Number of stages	.	.	.
1 stage	9.0%	13.7%	0.0%
2 stage	71.0%	39.2%	82.4%
3 stage	19.9%	47.1%	18.2%
Laparoscopic approach for IPAA	20.8%	30.4%	35.3%
Postop complications after IPAA	.	.	.
Anastomotic leak	4.3%	5.8%	0.0%
Abdominal sepsis or abscess	12.7%	13.7%	17.6%
Other infections	8.6%	11.8%	11.7%
Thrombotic complications	3.5%	3.9%	0.0%
Ileus or SBO	24.1%	21.3%	17.6%
90-day mortality after IPAA	0.4%	0.0%	0.0%
Length of stay after IPAA >=5 days	62.0%	45.1%	70.6%
Readmission within 30 days of IPAA	27.6%	33.3%	29.4%
Stoma reversal / ileostomy takedown	91.5%	100.0%	100.0%
Late complications after IPAA	.	.	.
Pouchitis	45.0%	37.3%	35.3%
Return to stoma	5.4%	5.9%	11.8%
Recurrence of Cdiff CMV infection aftre operation	n/a	9.8%	5.8%

in the literature. Aim of our study is to investigate the surgical procedures we use in rectovaginal fistula closure in patients with Crohn's disease.

Methods/Interventions: Patients who had a diagnosis of Crohn's disease and underwent surgery for rectovaginal fistula between 2010 and 2017 were identified from a prospectively maintained institutional database. Retrospective data was complemented with chart reviews. Collected variables included demographics, perioperative and operative variables and data regarding medications used. Patients who had inadequate follow-up to verify fistula status were excluded. Success of the procedure was defined as no symptoms at least 6 months after definitive repair and/or stoma closure.

Results/Outcome(s): A total of 75 patients underwent surgery for rectovaginal fistula including examination under anesthesia and seton placement. Nineteen patients were included in the final analysis who had surgery with intent to close the fistula and had at least six months of follow-up. Mean age was 44.7 ± 10.5 with a mean follow up duration of 29.6 months. 11/19 had previously underwent surgery to close the fistula and mean months from last repair to the current repair was 8.5 months (IQR: 4-12.5). 52.6% of the patients had a history of at least two surgeries to close the fistula. Overall healing rate was 63% (12/19). The most commonly performed procedure was transanal rectal advancement flaps (8/19) with a success rate of 50% and two patients reporting improvement with minimal symptoms. Success rates of various procedures are given in the table. Postoperative complications were seen in 2/19 patients (SSI and ileus in the first patient and urinary retention in the second patient). 8/19 patients received a biologic agent within 3 months of surgery and success rate in this group was 50%. Patients with perioperative diversion had higher rates of success compared with no diversion group (66% vs. 57%, $p=1$).

Conclusions/Discussion: Rectovaginal fistula in Crohn's disease is difficult to cure with at least half of these patients having multiple surgeries due to recurrence based on our results. Multiple procedures can be offered for this challenging problem in motivated patients. Perioperative diversion should be strongly considered.

EXTENDED THROMBOPROPHYLAXIS FOLLOWING COLORECTAL SURGERY IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE: A COMPREHENSIVE SYSTEMATIC CLINICAL REVIEW.

P145

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Purpose/Background: Postoperative venous thromboembolism (VTE) following colorectal surgery contributes to significant morbidity, mortality and healthcare cost utilization. Several studies have demonstrated the increased rates of VTE following colorectal surgery in patients with inflammatory bowel disease (IBD). The multifactorial pathogenesis is not fully understood, however has been hypothesized to be related to the relative hypercoagulable state, vitamin deficiency and concomitant steroid use in this patient population. Furthermore, fibrinolytic activity and impairment of platelet function occur with the inherent immune alterations in IBD. There are currently no published randomized control trials evaluating extended thromboprophylaxis after colorectal surgery in the setting of IBD. Therefore, the objective of this study was to comprehensively review the available literature evaluating the role of extended VTE prophylaxis following colorectal surgery in IBD patients in order to inform the creation of clinical guidelines.

Methods/Interventions: Using the assistance of an expert medical librarian, a comprehensive systematic clinical review of the medical and surgical literature on VTE prophylaxis following colorectal surgery in IBD patients was performed. The literature search included; Ovid Medline, EMBASE Classic, and PubMed databases. The following Medical Subject Headings (MeSH) were used: inflammatory bowel disease, digestive system surgical procedure, colorectal surgery, colectomy, embolism, thrombosis, anticoagulants. Reference lists of included studies and relevant reviews were assessed for additional references.

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Procedures done to definitively close RVF	All fistulas n=19	
	Total number (%)	Successful closure (%)
Transanal advancement flap	8 (42)	4 (50)
Transanal repair with tissue interposition (Martius or Gracilis flap)	3 (16)	2 (66)
Episioproctotomy	2 (10.5)	2 (100)
Fistulotomy	2 (10.5)	2 (100)
Coloanal anastomosis	2 (10.5)	2 (100)
Fistula plug	2 (10.5)	0 (0)
Active Smoker	8 (42)	6 (75)
Total	19	12 (63)

A qualitative analysis was performed on the identified studies using 10 clinical questions that were developed by three expert colorectal surgeons, regarding the use of VTE prophylaxis in IBD surgical patients. The questions were organized into; disease, patient, surgery, and cost specific categories. The Newcastle-Ottawa score was utilized to assess the quality of evidence of all included studies.

Results/Outcome(s): A total of 1232 articles and reviews were identified and following title and abstract reviews by three independent authors, 58 studies were selected for final analysis. Postoperative VTE rates ranged between 1.1% and 14.3%. Patient specific risk factors for postoperative VTE included; having ulcerative colitis (compared to Crohn's disease), increased age (>65) and obesity. Surgery specific risk factors for postoperative VTE included; open surgery, emergent surgeries and ileostomy formation. Specifically, colorectal surgeries that significantly increased the risk of postoperative VTE in IBD patients included total proctocolectomy with end ileostomy or ileal-pouch anal anastomosis, total abdominal colectomy, subtotal colectomy. The overwhelming majority of postoperative VTE events occurred within 30 days of surgery. Six studies concluded that postoperative extended VTE prophylaxis reduced VTE specific morbidity with no added bleeding risk. Furthermore, eight studies established health care cost savings with extended thromboprophylaxis. The risk of bias assessment using the Newcastle-Ottawa score demonstrated low risk of bias in patient selection and comparability, with variable risk of bias in reported outcomes in the included studies.

Conclusions/Discussion: Due to the improved medical management of IBD and decline in the need for surgery along with the relative low rate of VTE in this population, randomized controlled trials are challenging to perform. Therefore, observational studies alone can be used in support of the development of guidelines for prescribing practice of VTE extended prophylaxis in patients with IBD undergoing bowel resection. Furthermore, performing a meta-analysis was not possible given the high heterogeneity and common data source for all published studies. This clinical review has comprehensively assessed the role of VTE prophylaxis in postoperative IBD patients using 10 established clinical questions on this topic. Our recommendation, based on the observational studies included in this clinical review, is that extended thromboprophylaxis be used following colorectal operations in patients with IBD with either high risk surgical features (open surgery, emergent surgery, total proctocolectomy) or high risk patient factors (old age, obesity, malnutrition, chronic steroid use). Our hope is that our data along with other studies can inform the development of clinical guidelines on this topic.

ROLE OF INTERLEUKIN 10 GENETIC POLYMORPHISMS IN MEXICAN PATIENTS WITH RECTAL CANCER.

P146

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Purpose/Background: Chronic inflammation is a well-established risk factor for colorectal cancer. Interleukin-10 (IL-10) is a cytokine whose main biological function is to limit inflammatory responses and is crucial to maintain immune homeostasis of the gastrointestinal tract. The IL-10 gene has several polymorphic sites. Some single nucleotide polymorphisms (SNPs) of IL-10 have been associated with cancer risk. The aim of our study was to evaluate the role of SNPs rs1800896, rs1800872 and rs1800871 of IL-10 in Mexican mestizo patients with rectal cancer.

Methods/Interventions: A prospective study was conducted in which 53 patients with rectal cancer confirmed by histopathology and 52 healthy controls were included. Information was collected focused on the demographic, clinical, biochemical characteristics; CT, MRI and histopathological reports of each patient, by reviewing the clinical file. SNPs rs1800896, rs1800872 and rs1800871 of IL-10 were genotyped by RT-PCR with AB3130 kit.

Results/Outcome(s): By analyzing the alleles and genotypes of the three polymorphisms studied with local infiltration, locoregional and distance of the tumor, as well as with early and late stages of the disease; We identified that the AA genotype of SNP rs1800872 behaved as a protective factor for invasion of regional nodes [RM 0.14 (IC95% 0.02-0.80) $p = <0.04$], presence of distant metastasis [RM 0.30 (IC95% 0.10-0.83) $p = <0.01$] and for the development of a late stage of the disease (EC III-IV) [RM 0.14 (IC95% 0.02 - 0.79) $p = <0.04$]. On the other hand, the CC genotype of SNP rs1800871 was a protective factor for the presence of distant metastasis [RM 0.33 (IC95% 0.12 - 0.94) $p = <0.03$], whereas its CT heterozygous form was at risk for greater local infiltration (T3-T4) [RM 1.11 (IC95% 1.01 - 1.22) $p = <0.001$]. The allelic and genotypic frequencies of SNP rs1800986, as in the previous section, were not associated with local, locoregional or distant infiltration of the disease. When we evaluated the polymorphic sites of IL-10 with the response to treatment and surgical outcomes of our patients, we found that the genotypic GG frequency of SNP rs1800896 was a risk factor for non-response to neoadjuvant therapy [RM 4.0 (IC95% 2.82 - 5.65) $p = 0.005$], whereas the heterozygous AG genotype represented a protective factor for the non-response to neoadjuvant therapy [RM 0.25 (IC95% 0.17 - 0.35) $p = <0.005$]. The allelic frequency A [RM 0.22 (IC95% 0.08 - 0.58) $p = 0.001$] and the homozygous AA genotype [RM 0.20 (IC95% 0.06 - 0.64) $p = 0.003$]

of SNP rs1800872 were protective factors for non-response to therapy neoadjuvant. While the allelic frequency C [RM 4.42 (IC95% 1.70 - 11.44) $p = 0.001$] and the CC genotype [RM 6.77 (IC95% 2.86 - 17.90) $p = <0.001$] of the same polymorphic site were found as risk for the no response to neoadjuvance. As for the SNP rs1800871, the allelic frequency C [RM 0.27 (IC95% 0.11 - 0.69) $p = 0.004$] and the CC genotype [RM 0.20 (IC95% 0.06 - 0.60) $p = 0.004$], were protective for the non-response to neoadjuvant, whereas the allelic frequency T [MR 3.6 (IC95% 1.44 - 8.99) $p = 0.004$] and the genotypic frequency TT [RM 6.0 (IC95% 2.10 - 17.12) $p = <0.001$] resulted in risk for non-response to neoadjuvant therapy. Of the patients included who underwent surgical procedures, we found a protective factor for post-surgical complications at the allelic frequency A [RM 0.34 (IC95% 0.12 - 0.97) $p = <0.04$] and the AA genotype [RM 0.18 (IC95% 0.04 - 0.75) $p = 0.01$] of the SNP rs1800872, while its allelic frequency C [RM 2.86 (IC95% 1.02 - 8.04) $p = 0.04$] behaved as a risk for postoperative complications. SNP rs1800871 is also involved in post-surgical complications, with its allelic frequency C [RM 0.30 (IC95% 0.10 - 0.86) $p = 0.02$] and its homozygous CC genotype [MR 0.18 (IC95% 0.04 - 0.75) $p = 0.01$] protective factors for the development of post-surgical complications, however, its allelic frequency T [RM 3.26 (IC95% 1.15 - 9.18) $p = 0.02$] and homozygous TT genotype [RM 6.0 (IC95% 2.10 - 17.12) $p = <0.001$] represented a risk factor for postoperative complications.

Conclusions/Discussion: Our study suggests that interleukin 10 genetic polymorphisms could impact in different aspects in evolution of rectal cancer, particularly tumor localization, infiltration, progression, treatment response and post-surgical outcomes. This is the first study worldwide that associate polymorphisms of IL-10 with the neoadjuvant response and post-surgical outcomes exclusively in rectal cancer patients.

THE EFFICIENCY AND MECHANISMS OF CHINESE HERBAL ENEMA PRESCRIPTION(DHEP) FOR INHABITING INFLAMMATORY RESPONSE, REGULATING INTESTINAL MICROBIOTA IN ULCERATIVE COLITIS.

P147

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Purpose/Background: Ding and Xie's Herb enema prescription(DHEP) belongs to the intangible cultural heritage of united nations educational scientific and cultural organization. DHEP (specification: 250ml / bottle; Jiangsu medicine NO. Z040001781) drug composition mainly includes honeysuckle, mantle and bletilla for different UC patients. It has excellent curative effect. It controls

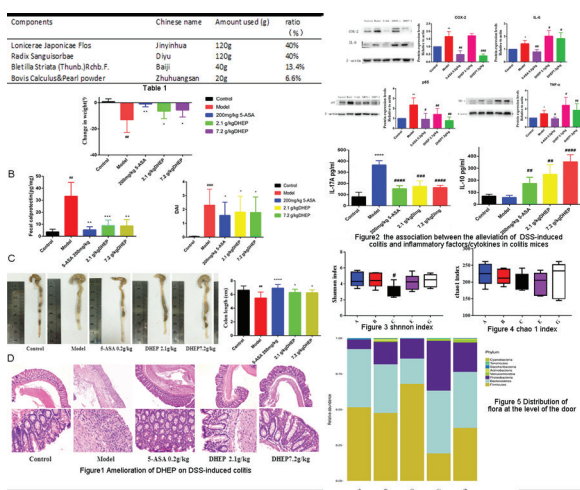
the proximal colon lesion and is superior to sulfasalazine. The potential targets of UC treatment focus on maintaining intestinal flora balance and inhibiting inflammatory responses. It is believed that the intestinal mucosa is over or unbalanced by the involvement of intestinal flora and its metabolites, among which interleukin-6 (IL-6), TNF- α and other cytokines activate the NF- κ B pathway to trigger and amplify the inflammatory process.

Methods/Interventions: C57BL/6J mice were randomly divided into four groups by freely drinking 3.5% sodium dextran sulfate (DSS) solution. The blank group without any treatment. Model group: DSS was given an equal dose of normal saline after modeling. DHEP low-dose group: 2.1g/kg/day enema, DHEP high-dose group: 7.2g/kg enema. Observe the disease activity index of each group, HE staining to observe the general view of colon tissue, Western blot detection of TNF- α , IL-10, IL-1 β , IL17A levels of expression. NF- κ B-related pathway proteins NF- κ B, I κ B expression, further using High-throughput 16S rRNA sequenced the mice colonic contents base on the Illumina MiSeq platform.

Results/Outcome(s): 1. **Amelioration of DHEP on DSS-induced colitis** From the fourteenth day of rectal administration of DSS, mice showed increasingly fecal calprotectin and severe symptoms. Compared to the normal group (Figure 1A), DSS-induced colitis mice (M) lost weight throughout the trial period ($p < 0.01$), which was rescued by the DHEP treatment. Disease activity index (DAI) and fecal calprotectin were prominently higher in the model group than that in the normal group ($p < 0.01$). Comparison with the model group, treatments with DHEP and 5-ASA notably reduced DAI and fecal calprotectin ($p < 0.01$) (Figure 1B). Shortened colon length is an important physiological index of colitis. DSS treated mice showed substantial reduction in colon length compared to the normal group ($p < 0.001$). DHEP alleviated the situation of colon shortening (Figure 1C) $p < 0.05$. The H&E staining indicated that severe pathological changes in the colonic tissues of model mice, which were alleviated by DHEP treatment ($p < 0.01$) (Figure 1D). Compared with normal mice, the levels of many cytokines including IL-6, TNF- α , IL-17A and COX-2 were increased, while IL-10 were decreased in DSS-induced colitis mice. However, the cytokine levels tended to be restored to the normal group after enema administration of DHEP (Figure 2). 2. **Microflora** 2.1 Richness and diversity estimation for colon contents bacterial populations Shannon indexes represent microbial diversity in table static differences were not observed in Shannon indexes among the DSS group, DHEP group and the normal control group, However, which were risen by 5-ASA treatment ($p < 0.05$) (Figure 3) In the Chao1 indexes in the DSS group were much lower than those in the normal control group, but statistical differences were not observed. as well as 5-ASA and DHEP group. A total of 8 major bacteria were detected at the gate taxonomy level (Figure 4). Firmicutes

and Bacteroidetes account for a large proportion of the five groups of fecal bacteria and are the main components of fecal bacteria. Comparing the proportion of bacteria in the five groups of the two classification levels, the results showed that there was no significant difference between the model group and the blank group in the two classification levels of Firmicutes and Bacteroidetes. There was a significant difference in firmicutes between the DHEP high-dose group and the model group ($p < 0.01$). Some of the smaller proportion of gate-level bacteria also showed significant changes after drug administration intervention. In the high dose group, the Actinobacteria level was reduced 10 times after the administration, and the Tenericutes level was increased by 5 times.

Conclusions/Discussion: DHEP protects mice from DSS-induced colitis. For the first time, we elaborated on the mechanism of action of compound enema. This study clarified two therapeutic mechanisms, including effective inhibition of inflammatory response, regulation of intestinal microbiota, and ultimately reduction of downstream target TNF- α , IL6, IL-17A COX-2 or upstream target IL-10 by selective down-regulation of NF- κ B signaling pathway.



EFFICACY OF SACRAL NERVE STIMULATION FOR TREATMENT OF FECAL INCONTINENCE.

P148

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Purpose/Background: The purpose of this study was to assess the effects and functional outcomes of sacral nerve stimulation using InterStim™ in adults. Background: Fecal incontinence is a physically and emotionally disabling condition that impairs the quality of life. Sacral Nerve Stimulator (SNS) became a preferred method of treatment symptoms of fecal incontinence in patients who failed non-operative management. It is a less invasive, outpatient surgical method, which is easier, and well tolerated

by patients with minimal restrictions to daily routine in postoperative period. Main outcome measures: Change in the Cleveland Clinic Fecal Incontinence Score (0 best; 20 worst) in postoperative period as compared to the preoperative score will be the primary outcome. Secondary outcomes include adverse reactions and postoperative complications including infection, lead migration, or need for explantation.

Methods/Interventions: Study Design: Retrospective, descriptive survey targeting all patients who have undergone placement of SNS as a treatment of fecal incontinence at Greenville Memorial Hospital between August 2016 and June 2018. Data collection includes adverse reactions and postoperative complications including infection, lead migration, or need for explantation. For pre-operative assessment we will be using a questionnaire filled out by every patient as a part of preoperative work up (See attached table). Patients will then be contacted by phone using a standardized script to assess for post-operative functional status using the Cleveland Clinic Incontinence Score. Only approved study team members will be contacting patients. Patients may skip questions or offer “no opinion”. Postoperative follow up ranged from 2 weeks to 2 years.

Results/Outcome(s): Upon review and contact of 29 patients who have undergone SNS placement as a treatment for fecal incontinence, the average Cleveland Clinic Fecal Incontinence score has shown great success of the procedure. The average pre-operative incontinence score was 15.7, and the average post-operative score was 5.3. Often, the only reason this score is still present is that the patient has been wearing a pad for so long and is too anxious to stop. 85.2 percent of patients recorded 100 percent satisfaction and find themselves with no issues or complications. Those without 100 percent satisfaction felt that way due to their inability to have an MRI with the placement of the device, or were unsure how to adjust the stimulator. If this was the case, patients were instructed to schedule a follow-up appointment so that their level of stimulation could be adjusted. No patients reported post-operative infection or lead migration.

Conclusions/Discussion: Sacral nerve stimulation is an effective method for treatment of fecal incontinence, as it is a minimally invasive procedure with a short recovery period. This procedure has greatly improved quality of life for the patients who have chosen to undertake it, and many are able to leave their home and participate in social activities once again.

Cleveland Clinic Incontinence Score

Please tick one box in each row to indicate on average how often you experience the following:

	Never	Rarely Less than once a month	Sometimes Less than once a week	Usually Less than once a day	Always Everyday
a. Solid stool leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Liquid stool leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Gas leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Pad use (for stool)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Lifestyle restriction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

This is the table that was used to assess pre-operative and post-operative functional status.

AMPHIPHILIC POLYPEPTIDE-BASED MICELLES DELIVERING 20(S)-GINSENSOSIDE RG3 AND CURCUMIN TO TREAT COLORECTAL ADENOCARCINOMA.

P149

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Changchun, China

Purpose/Background: Colorectal cancer (CRC) is a major malignancy characterized by high metastasis and recurrence rates. Local resection plus systematic chemotherapy are the main methods used to treat patients with CRC. However, the many limitations (e.g., short circulation time, obvious cytotoxicity to normal organs, and unsatisfactory cancer prevention results) of traditional chemotherapy restrict its further application. Therefore, it is necessary to find a method to overcome these challenges and achieve better chemotherapeutic efficacy in CRC treatment.

Methods/Interventions: In this study, 20(S)-ginsenoside Rg3 (Rg3) and curcumin (Cur)-co-loaded poly(ethylene glycol)-block-poly(L-glutamic acid-co-L-phenylalanine) (mPEG-b-P(Glu-co-Phe)) micelles were prepared. Both Rg3 and Cur play an important role in tumor apoptosis and reactive oxygen species (ROS) generation. The synergistic effects of Rg3 and Cur co-loaded micelles against CRC were examined through the *in vitro* drug release, cytotoxicity, cellular uptake, *in vivo* tumor inhibition, *in vivo* drug biodistribution, and pharmacokinetic detection studies.

Results/Outcome(s): The mPEG-b-P(Glu-co-Phe) micelles could target the drugs to cancer cells and had a longer blood circulation time. Both Rg3 and Cur could be released rapidly from the micelles within tumor cells. Orthotopic and patient-derived xenograft (PDX) CRC models were developed to evaluate the anticancer efficiency of the Rg3 and Cur-loaded micelles. The *in vivo* study indicated that the dual-drug loaded micelles could significantly inhibit tumor proliferation by synergistically increasing the expression of caspase-3 and decreasing the expression of reactive oxygen species modulator 1 (ROMO1) (Figure 1).

Conclusions/Discussion: Our study demonstrated the good potential of the Rg3 and Cur-loaded micelles to treat CRC.

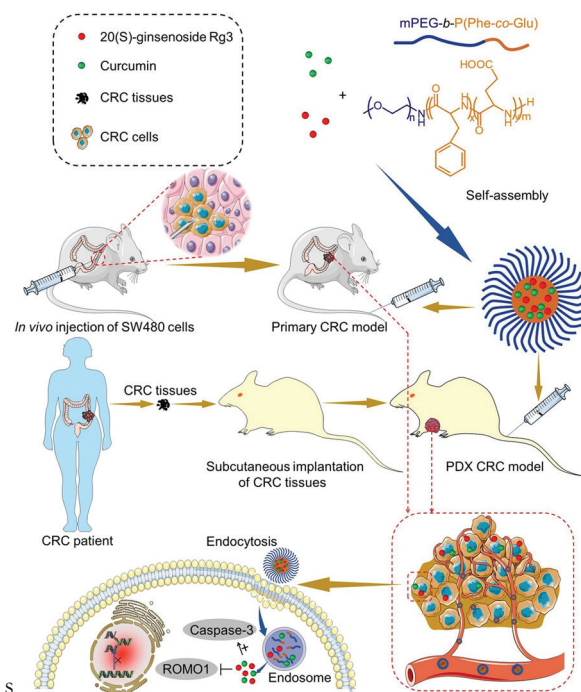


Figure 1. Schematic illustration of the construction and application of Rg3 and Cur-co-loaded mPEG-b-P(Glu-co-Phe) micelles to prevent CRC.

APPLICATION OF OPTICAL METABOLIC IMAGING IN A NOVEL PRECLINICAL TREATMENT MODEL OF ANAL CANCER.

P150

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Purpose/Background: Both the incidence and mortality of anal cancer continue to increase annually, however, therapeutic options for these patients have remained unchanged for the last 40 years. Failure of standard of care chemoradiotherapy often results in the need for radical surgical resection, which is associated with significant morbidity and 5-year survival rates below 50%. Mutation analyses and recent data from our laboratory provide strong evidence that the PI3K/AKT/mTOR pathway has an important role in anal carcinoma development. Even with this molecular evidence there are limited preclinical models to test potentially effective therapeutics to improve anal cancer treatment. Optical metabolic imaging (OMI) is a non-invasive method that utilizes the fluorescence properties of NADH and FAD to accurately measure the intracellular metabolism of cancer cells. OMI is able to accurately and reproducibly quantify cellular responses to therapeutic agents in other clinical and preclinical models. We hypothesized that dual PI3K/mTOR inhibition, with LY302414, would produce a treatment effect similar to standard of care chemoradiotherapy in novel *in vitro* models of anal cancer. We also hypothesized that metabolic changes, which occur prior to changes in tumor death would be an effective way of measuring treatment response.

Methods/Interventions: Utilizing an established murine model of anal cancer where mice overexpress HPV oncoproteins E6 and E7 (*K14E6/E7*), we developed anal tumors via weekly topical carcinogen treatment (DMBA). Additionally, we cultured tumor spheroids from mice expressing two common mutations in the gene expressing the catalytic domain of PI3K, *Pik3ca*, along with the HPV oncoproteins. These mutations, E545K and H1047R, are the two most common mutations in human anal cancer. Tumor tissue from mouse anal tumors of all three genotypes were grown in 3D culture suspended in a growth matrix to produce tumor spheroids. Spheroid diameter and OMI were used to measure treatment response. Maximal spheroid width utilizes tumor spheroids grown in 3D culture for 48 hours with light microscopy measurements at initiation of therapy (0 hours) and 48 hours. OMI utilizes the fluorescence properties of NADH and FAD to quantify the intracellular concentration of these molecules and measure intracellular metabolism. Statistical comparisons of maximal spheroid width and OMI were conducted using ANOVA analysis in SPSS (version 24). All experiments were conducted in triplicate using two or more of the following groups: 1) no treatment controls (NTC), 2) LY3023414 (LY3, 100-400nM), 3) chemoradiotherapy (CRT), combining mitomycin C (MMC, 25mM), 5-fluorouracil (5-FU, 10mM) and radiation at 0.5Gy, and 4) LY3 plus CRT.

Results/Outcome(s): A dose-response analysis of LY3023414 at three different concentrations was performed and no difference between the three concentrations (100, 200 and 400nM) was found in terms of growth at all three time points (24, 48 and 72 hours) and concentrations ($P < 0.0005$). Further experiments were conducted using 100nM LY3023414 with measurements taken at baseline and 48 hours. Comparing the NTC and LY3 groups, in *K14E6/E7* mouse spheroids, 100nM LY3 had both a significant growth inhibitory effect and reduced, on average, intracellular metabolism compared to untreated controls ($P < 0.05$ and $P < 0.0001$, respectively). The efficacy of LY3 alone in the mice containing the HPV oncogenes with E545K mutation were similar to that of the spheroids with the HPV proteins alone ($P < 0.0005$ and $P < 0.0001$ for diameter and OMI, respectively). However, in mice contain both the HPV oncogenes and the H1047R mutation, the efficacy of LY3 alone was lost with respect to spheroid diameter, but not intracellular metabolism ($P = 0.76$ and $P < 0.0001$, respectively). Finally, we sought to interrogate the ability of LY3023414, when added to standard of care chemoradiotherapy, to provide an additional inhibitory treatment effect on spheroid growth and metabolism. However, when compared to chemoradiotherapy alone, in the three cell lines tested (*K14E6/E7*, *K14E6/E7/Pik3ca^{E545K}*, and *K14E6/E7/Pik3ca^{H1047R}*) we did not see an additional treatment effect when adding LY3 to the chemoradiotherapy (CRT vs LY3 plus CRT: 0.66, 0.93, and 0.98, respectively). The results of the metabolic analyses were similarly non-significant.

Conclusions/Discussion: The results above provide evidence that metabolic measurements of drug efficacy may be

a more sensitive and accurate than our method of measuring changes in spheroid diameter. Furthermore, our data shows the PI3K/mTOR inhibition is effective, and based upon the metabolic changes, may be independent of important mutations often seen in human anal cancer. Future experiments are needed to investigate ability of novel therapeutics, such as PI3K/mTOR inhibitors, the reduce or eliminate of MMC, and interrogate other PI3K/mTOR inhibitors for their inhibitor effect in cancers with common *Pik3ca* mutations.

TARGETING COLON CANCER STEM CELL SURVIVAL WITH A NOVEL CONNEXIN43 MIMETIC PEPTIDE.

P151

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Roanoke, VA

Purpose/Background: Colorectal cancer is the third leading cause of cancer in the world and one of the highest causes of cancer-related deaths in US with a 5-year relative survival rate of only 8%-20% in late stage disease. The current treatments for stage IV, metastatic disease include neoadjuvant chemotherapy regimens with subsequent surgical resection or treatment with a biologic agent. Regardless, chemo/biotherapy has shown limited efficacy as demonstrated by the high rate of tumor recurrence due to development of drug-resistance in nearly all stage IV patients. Lack of efficient treatment has been associated with heterogeneity of the tumor which includes a sub-population of chemoresistant cancer stem cells (CSCs). Cancer stem cells undergo epithelial-mesenchymal transition (EMT), an important cellular process that confers invasive and metastatic potential to malignant cells. Therefore, there is a need for novel targeted therapies toward colorectal CSCs to prevent tumor recurrence, metastasis and improve patients' outcome. Our data demonstrate for the first time that colon CSCs overexpress the gap junction protein Connexin43 (Cx43) at the transcription and translation levels. Cx43 has been shown to act as a tumor suppressor in colon cancer, however increased levels of Cx43 have also been observed in stage III and IV compared to stage I colon adenocarcinomas, and redistribution of Cx43 from junctional structures to cytoplasmic pools has been reported during colon cancer progression. Therefore, altering the localization and/or activity of Cx43 rather than Cx43 expression represents a novel and potent strategy in colon cancer treatment. The subcellular localization of Cx43 regulates its functions in cell proliferation, migration, and apoptosis, by junction-dependent and -independent mechanisms. Cx43 is regulated by multiple sites for protein-protein interaction within its carboxy-terminus (CT) that includes a tubulin binding domain. Previous research in our laboratory has identified a tumorigenic role for Cx43 through its interaction with microtubules in glioblastoma CSCs. Cx43 mimetic peptides

such as JM2 (juxtamembrane 2) have been developed to modulate the function of Cx43 CT interactions. JM2 is composed of the Cx43 CT amino acids encompassing the microtubule-binding sequence, and an antennapedia cell penetration domain that promotes cellular uptake. Our data demonstrate a significant decrease in colon CSC survival following treatment with JM2 as observed with inhibition in tumorsphere formation *in vitro*. In ongoing work, we are isolating CSCs from colon cancer specimens donated by patients of the Carilion Clinic General Surgery to confirm the effect of JM2 on targeting colon CSC survival.

Methods/Interventions: Tumor cells and cancer stem cells will be isolated and cultured from fresh biopsy tissue from patients identified and consented out of Carilion Clinic Surgical Oncology. Colon cancer stem cells derived from HCT116 and HT29 cell lines will also be utilized to assess Cx43 status and JM2 treatment effect. Real-time quantitative PCR and Western blotting will be performed to determine Cx43 transcription and protein expression in both populations of cells. Distribution of Cx43 will be visualized via immunofluorescence confocal and super resolution microscopy. Cells will be treated with the JM2 peptide and cell survival will be assessed via MTS enzymatic and tumorsphere count assays, with caspases3/7 activity as a measure of apoptosis.

Results/Outcome(s): Our research has demonstrated, for the first time, that CSCs exhibit higher Cx43 levels relative to non-stem cells. Specifically, modulation of Cx43 intracellular interactions via the JM2 mimetic peptide results in decreased cell survival in HCT116 CSCs expressing high levels of Cx43. Furthermore, we have collected primary tissue of stage I-III patients from 13 subjects thus far from Carilion Clinic. Currently, primary CSC culture has confirmed elevated Cx43 expression relative to non-stem cells. Our ongoing research includes determining the effect of JM2 on cell survival with cultured CSCs from collected patient samples.

Conclusions/Discussion: In conclusion, our research reveals that modulation of Cx43 intracellular functions may represent a paradigm shift in the treatment and management of colon adenocarcinoma and JM2 represents a novel therapeutic opportunity in colon cancer treatment through eradicating the colon CSC populations.

16S RRNA TAXONOMIC ANALYSIS OF THE APPENDIX BACTERIAL MICROBIOME IN HEALTH AND DISEASE.

P152

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Purpose/Background: The vermiform appendix is believed to act as a “reservoir” of commensal bacteria within the colon, repopulating the colonic microbiome in times of stress. Several studies have demonstrated an association

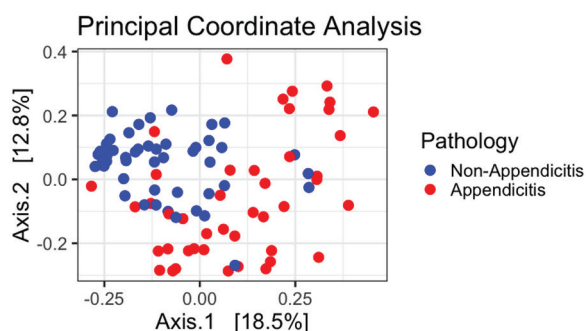
between appendectomy and altered susceptibility to diseases such as inflammatory bowel disease which is hypothesised to be microbiome-mediated. Furthermore, acute inflammation of the appendix is a common disorder yet little is known regarding its aetiology. We aimed to apply next-generation sequencing technology to investigate the appendix microbiome in health and disease. We hypothesised that acute inflammation of the appendix would result in significant changes in bacterial community structure.

Methods/Interventions: This prospective, observational study recruited two cohorts of adult patients: those undergoing diagnostic laparoscopy and appendectomy for suspected appendicitis and those undergoing right hemicolectomy for right-sided colorectal malignancy. In all patients, appendix tissue was harvested from the resected specimen. DNA was extracted from appendix tissue and microbiome taxonomic profiling was performed by sequencing the V1-2 region of the 16S rRNA gene. Appendicitis was defined pathologically by the presence of a transmural neutrophilic infiltrate.

Results/Outcome(s): 92 patients were included in the study: 67 patients undergoing diagnostic laparoscopy for suspected appendicitis and 25 undergoing right hemicolectomy. Of the patients undergoing diagnostic laparoscopy, 44 had appendicitis (13 advanced with perforation or gangrene) and 23 had a microscopically normal appendix. Compared to non-inflamed samples ($n = 48$), inflamed appendix samples ($n=44$) demonstrated significantly reduced alpha diversity (Shannon diversity 4.43 vs. 3.77, 0.33 – 0.99, $p < 0.001$). In contrast, beta diversity was significantly higher in inflamed samples (Bray Curtis 0.90 vs. 0.83, 0.05 – 0.08, $p < 0.0001$). There were no significant differences in diversity between suppurative and advanced appendicitis. These results suggest that, although inflammation results in a reduction in the richness of bacterial taxa in the appendix, it also increases the heterogeneity between samples. This can be seen in an unsupervised principal coordinate analysis where non-inflamed appendix samples (blue) clearly cluster relatively tightly together but appendicitis samples are more spread out over the plot (figure). Supervised orthogonal partial least squares discriminant analysis (OPLS-DA) confirmed the presence of significantly different bacterial community structure in appendicitis compared to non-appendicitis samples ($R^2X = 0.2$, $Q^2Y = 0.45$, $p = 0.05$). No such differences were demonstrated between advanced and suppurative appendicitis or between normal appendix samples from patients undergoing right hemicolectomy versus diagnostic laparoscopy for abdominal pain. We then investigated the relative abundance of bacterial taxa in appendicitis versus non-appendicitis samples. We found that appendicitis samples had significantly higher abundance of *Comamonas* (8.8 log fold increase, $p < 0.001$), *Haemophilus* (2.9 log fold increase, $p < 0.05$) and *Eggerthella* (2.6 log fold increase, $p < 0.05$) genera in appendicitis samples. Furthermore, the abundance of many commensal genera were depleted in

appendicitis samples, including Coprococcus (6.0 log fold decrease, $p < 0.001$), Ruminococcus (3.9 log 2 fold decrease, $p < 0.01$), Roseburia (2.5 log fold decrease, $p < 0.001$) and Faecalibacterium (2.8 log fold decrease, $p < 0.001$). 32/47 (72%) appendicitis samples were positive for one of Comamonas ($n=6$), Haemophilus ($n=10$) or Eggerthella ($n=16$) compared to only 13/48 (27%) non-appendicitis samples ($p=0.0001$). Interestingly, in any given positive sample, only one of the aforementioned genera was present.

Conclusions/Discussion: This is the first comprehensive 16 rRNA taxonomic analyses of the bacterial microbiome in normal and inflamed adult appendixes. We demonstrate that inflammation of the appendix results in significant alterations in microbial community structure. In particular, the communities collapse in richness, losing typical commensal bacteria, and becoming dominated by one of a range of pathogenic phyla including Comamonas, Haemophilus and Eggerthella. The diversity of dominant pathogens found in inflamed samples would argue against a common bacterial aetiology for acute appendicitis, as has been postulated in the literature, and rather suggests that inflammation itself drives secondary changes in the microbiome.



A DINUCLEOTIDE DELETION IN THE CD24 GENE IS A POTENTIAL RISK FACTOR FOR COLORECTAL CANCER.

P153

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Purpose/Background: Colorectal cancer (CRC) is the second most common cause of death from cancer in Israel. About 20% of CRC cases are family related. The genetic background that is associated with this subgroup is not well known. CD24 is a sialoglycoprotein anchored to the cell surface via glycosylphosphatidylinositol (GPI) and involved in various biological and intracellular signaling processes. We have shown that CD24 plays an important role in the early stages of the multistep process of colorectal carcinogenesis, already at the stage of adenoma. There are no known mutations in the gene, however several single nucleotide polymorphisms (SNPs) are reported to exert

diverse effect on cancer risk. The Aim of this study is to elucidate whether CD24 TG/del genetic variants are associated with susceptibility to colorectal cancer.

Methods/Interventions: The study included 179 subjects, 36 with CRC (prior to surgery) and 143 healthy control subjects. DNA was purified from peripheral blood leukocytes, and by using restriction fragment length polymorphism (RFLP) analysis, the CD24 gene was genotyped for the specific genetic variant, TG deletion. In addition, CD24 protein expression levels were determined by Western blotting analysis in both groups.

Results/Outcome(s): The incidence of the TG/del was higher among the CRC patients compared to healthy controls, 14% and 10% respectively ($P=0.54$). The levels of CD24 protein were significantly higher among CRC patients. There were not significant differences in CD24 expression between CRC patients at different stages of the disease, nor between patients who carry the mutation and those who did not.

Conclusions/Discussion: CD24 genetic variant might be of a clinical value for risk assessment as part of cancer prevention programs. Further study on larger populations is still needed in order to validate the importance of this dinucleotide deletion at the CD24 gene in CRC development. Overexpression of CD24 protein occurs at the early stage of the multistep process of CRC carcinogenesis, and a simple and non-invasive blood sample based on CD24 expression on peripheral blood leukocytes as a potential biomarker can contribute to early diagnosis.

CLINICAL IMPLICATIONS OF DISTINCT TUMOR MICROENVIRONMENT SIGNATURES BETWEEN EARLY AND LATE-ONSET COLORECTAL CANCER.

P154

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 Portland, OR

Purpose/Background: Early-onset (≤ 45 years) colorectal cancer (CRC) is rising compared to late-onset CRC (≥ 65 years) demanding clinical attention. Understanding the relationship between the localized immunity and the tumor known as tumor microenvironment (TME) may hold the key to understanding this notable shift. We hypothesized that there are key TME differences between early and late-onset CRC that may additionally impact clinical outcomes.

Methods/Interventions: We performed RNA sequencing of 770 known immune markers on tumors (primary and adjacent non-cancerous tissue) from early and late-onset CRC patients matched by stage and treatment using the Nanostring platform. Normal tissue was used as control. qPCR and immunohistochemistry (IHC) were performed for validation on an independent cohort. Patient oncologic outcomes were reviewed.

Results/Outcome(s): Sequencing of 24 tumors in each cohort and 10 normal revealed 65 up-regulated and 15 down-regulated genes in early compared to late-onset disease. Highest differential expression included upregulation of CCL19, BLINK, CD1D and downregulation of CXCL3 ($p < 0.05$). qPCR validated significantly lower expression of CXCL3 in early compared to late-onset ($p < 0.05$). We found that in both cohorts Improved disease-free survival (DFS) is associated with increased CXCL3 qPCR expression. (Figure 1, $p < 0.05$). In addition, IHC of an independent cohort ($n = 17$) confirmed similarly improved overall survival with increased CXCL3 expression.

Conclusions/Discussion: Distinct TME differences were identified between early and late-onset CRC. Increased expression of CXCL3 offers a positive prognostication marker.

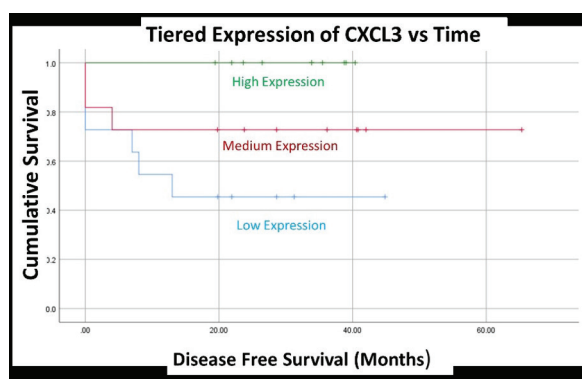


Figure 1: All samples were separated into 3 equal ($n = 11$) groups high, medium, and low based on qPCR expression of CXCL3 and plotted against time. High expression (Green) showed no disease recurrence while medium (Red) and low (Blue) expression patients had disease recurrence ($p < 0.05$).

ATHEROSCLEROTIC RISK ASSESSMENT AND COMPUTED TOMOGRAPHY ANGIOGRAPHY PREDICTING THE CRITICAL HEMODYNAMIC ALTERATION OF THE MARGINAL ARTERY AFTER HIGH LIGATION OF THE INFERIOR MESENTERIC ARTERY IN RECTOSIGMOID COLON CANCER PATIENTS.

P155

G. Son

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Purpose/Background: Colon perfusion status is important for determining postoperative anastomotic complications. High ligation of the inferior mesenteric artery may cause hemodynamic instability when there is stenotic calcification associated with vascular atherosclerosis or congenitally insufficient collateral circulation. To evaluate atherosclerotic cardiovascular risk assessment and vascular parameters of computed tomography angiography in relation to hemodynamic alterations according to

ligation levels of the inferior mesenteric artery in rectosigmoid colon cancer patients.

Methods/Interventions: Atherosclerotic risk assessment was performed using Framingham general cardiovascular risk score system based on age, sex, smoking, systolic blood pressure, hypertension, diabetes, and cholesterol. Atherosclerotic calcification was evaluated using computed tomography angiography. Mean arterial pressure was measured in marginal artery of the colon when the inferior mesenteric artery was (on) and was not (off) clamped. Mean arterial pressure reduction and mean arterial pressure index were calculated to determine critical hemodynamic change.

Results/Outcome(s): High mean arterial pressure reduction ($>30\%$) and critical mean arterial pressure index (<0.4) occurred in 6 cases (13.0%), respectively, after inferior mesenteric artery clamping. Atherosclerotic calcification of the inferior mesenteric artery occurred in 11 patients (23.9%). Five of these (10.9%) patients had superior mesenteric artery calcification. Critical hemodynamic alteration after inferior mesenteric artery clamping was associated with high atherosclerotic risk score and inferior mesenteric artery length, rather than atherosclerotic calcification or presence of intermesenteric artery. Multivariate analysis indicated that high atherosclerotic risk was an independent predictor of hemodynamic change after inferior mesenteric artery clamping.

Conclusions/Discussion: The atherosclerotic risk assessment was a useful predictor of critical hemodynamic change of mesenteric marginal artery after inferior mesenteric artery ligation during laparoscopic rectosigmoid colon surgery.

REDUCTION OF COLONIC BLOOD FLOW IN PEDICLED COLONIC SEGMENTS IN RATS AND ITS CONSEQUENCES FOR ANASTOMOTIC LEAKAGE.

P156

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Purpose/Background: Anastomotic leakage (AL) is a major postoperative complication and affects morbidity and mortality. However, AL rate after rectal surgery still remains high. Although intestinal perfusion is generally considered to be critical for anastomotic healing, multifactorial factors are involved in the formation of AL, and little is known about the relationship between blood supply and AL. ICG fluorescence angiography has been increasingly used in colorectal surgery, but its usefulness remains to be elucidated. The purpose of this research is to investigate whether the AL rate could change with variations in intestinal perfusion and whether quantitative assessment of blood flow could predict AL precisely.

Methods/Interventions: In this rat model, a marginal artery of descending colon was ligated to make an ischemic pedicled colonic segment, and then end-to-end anastomosis was performed 3cm above the peritoneal reflection. This experimental controlled trial assigned 43 wister rats to four groups randomly; non-ischemic colon group (Control group), 1cm-ischemic colon group (Group 1), 2cm-ischemic colon group (Group 2), and 3cm-ischemic colon group (Group 3). After creation of a colonic segment, colonic blood flow was analyzed by using ICG fluorescence imaging. For quantitative assessment of ICG intensity, we used luminance analyze software (ROIs), and the following four parameters were measured; 1. Fmax (Fluorescence intensity maximum value), 2. Tmax (the time from the bottom to the maximum value), 3. T1/2 (the time from the bottom to half of the maximum value), and 4. Slope (Fmax/Tmax). Five days later, a second-look surgery was performed to investigate the AL rate and to measure the bursting pressure of the anastomosis.

Results/Outcome(s): The AL rates were 0% (0/10) in Control group, 22.2% (2/9) in Group 1, 25% (2/8) in Group 2, and 50% (4/8) in Group 3. Regarding the intestinal blood flow, each parameter in the four groups were as followed (Control group vs. Group 1 vs. Group 2 vs. Group 3); 1) Fmax (AU): 141.6 vs. 101.7 vs. 91.2 vs. 64.4 ($P < 0.0001$), 2) Tmax (sec): 192.8 vs. 172.6 vs. 208.2 vs. 230.3 ($P = 0.06$), 3) T1/2 (sec): 8.8 vs. 18.7 vs. 35.2 vs. 76.9 ($P < 0.0001$), and 4) Slope (AU/sec): 0.7 vs. 0.6 vs. 0.45 vs. 0.3 ($P < 0.0001$). Two rats in Group 1, two rats in Group 2 and four rats in Group 3 died until postoperative day 5 (POD5). On POD5, bursting pressure of each group was 167.5, 100, 82.5, and 77 mmHg (Control group, Group 1, Group 2, and Group 3, respectively; $P = 0.0004$). Regarding the relationship between colonic blood flow and AL, Fmax and Slope of non-leakage group ($n = 27$) were significantly higher than those of the leakage group ($n = 8$) (120.5 vs. 74.5, $P = 0.02$; 0.6 vs. 0.35, $P = 0.002$, respectively). The significant correlation between colonic blood flow and bursting pressure could be observed in Fmax and Slope by the Pearson's correlation analysis (Fmax: $P = 0.0006$, correlation coefficient (r) = 0.81; Slope: $P < 0.0001$, $r = 181.8$). The Slope of the AL group was less than 0.4 in 6 cases (6/8), whereas that of the non-AL group was in 5 cases (5/27): with a Slope cutoff value of 0.4, the sensitivity and specificity for the prediction of AL were 75% (6/8) and 81.4% (22/27).

Conclusions/Discussion: The creation of a pedicled colonic segment gradually reduced blood supply to its distal part. The AL rate and strength of colonic anastomosis were significantly correlated with the blood flow in a pedicled colonic segment. ICG fluorescence angiography could accurately predict AL in this rat model. Especially, Slope (Fmax/Tmax) was useful for predicting the occurrence of AL.

COLON AND RECTAL ROBOTIC SURGERY CURRICULUM: DOES EXPANSION MEAN DILUTION?

P157

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Purpose/Background: Robotic colon and rectal surgery adoption is increasing. Training programs in colon and rectal surgery have a wide variability in terms of robotic surgical training. The APDCRS (Association of Program Directors for Colon and Rectal Surgery) aimed to address this by establishing a robotics curriculum and establishing the requirement that trainees maintain a detailed standardized robotic case log. Though the case volume needed to progress through the colon and rectal surgery learning curve varies widely, the learning curve for robotic total mesorectal excision is generally accepted to be between 35-40 console cases. There is an increasing demand for newly trained colon and rectal surgeons to attain proficiency in robotic surgery with adequate case volume and console time at the time of training completion. Our goal is to evaluate the consistency and effective implementation of the APDCRS robotics curriculum. First, we aim to evaluate consistency by comparing robotic surgical experience of trainees between different academic years for programs that used the curriculum in both 2016-17 and 2017-18 (Veteran Programs). Secondly, we aim to evaluate the efficacy of curriculum implementation by comparing trainee robotic operative experience between trainees in Veteran Programs to those that implemented the curriculum solely for the 2017-18 academic year (Adopting Programs).

Methods/Interventions: This study is a retrospective cohort study of the APDCRS robotic case log, a prospectively maintained database of 3158 cases. The database includes detailed information about each individual case performed by trainees in ACGME accredited colon and rectal surgery residencies and Fellowship Council accredited colon and rectal minimally invasive surgery fellowships over the course of two academic years (2016-17 and 2017-18). The database includes case numbers, names of trainees and attending surgeons, dates of operations, and percentage of cases performed by the trainee at the console as determined subjectively by the operating trainee. The cohort was separated into three groups. Trainees in Veteran Programs were further broken down into two subgroups of surgeons that trained in the 2016-17 academic year (A1) and in the 2017-18 academic year (A2). The third group of trainees are from programs that adopted the robotic curriculum solely for the 2017-18 academic year (Adopting Programs). The outcome measures of trainee robotic experience in this study are case volumes per trainee and average percentage of each case performed by the trainee at the robotic console.

Trainee robotic experience in Veteran Programs for the 2016-17 academic year (A1) was compared to experience in the 2017-18 academic year (A2). Then, trainee experiences from the A2 group were compared to programs that more recently implemented the robotics curriculum in 2017 (Adopting Programs). As there were two programs that only participated in the 2016-17 academic year, trainees from these programs were excluded from the analysis. Linear regression modeling was used for analysis with the statistical program R.

Results/Outcome(s): Trainees from 50 programs were included in the study with 25 programs participating in both years 2016-17 (A1) and 2017-18 (A2) and 25 programs solely participating in the 2017-18 year (Adopting Programs). Group A1 had 40 trainees and 80 attendings with an average of 45 cases (median 41, range 2-115) per trainee. Group A2 had 45 trainees and 91 attendings with an average of 47 cases per trainee (median 40, range 1-96). Adopting programs had 43 trainees and 88 attendings with an average of 19 cases per trainee (median 14, range 4-48). The A1 and A2 groups were found to be similar in average percentage of console time per fellow ($p=0.19$). Console time for the A2 group and trainees from Adopting Programs was also similar. ($p=0.49$). Case volume per fellow was significantly higher for trainees in Veteran Programs (A1 + A2) as compared to Adopting Programs ($p < 0.001$).

Conclusions/Discussion: Trainees in programs participating in the APDCRS robotics curriculum over the course of both the 2016-17 and 2017-18 academic years had a consistent average console time per case between different academic years. Trainee console time in these programs was similar to programs that implemented the curriculum in 2017. Trainees in programs participating in the curriculum for both years of the study had median case numbers that surpassed most estimates of the robotic colorectal surgery learning curve. Trainees in Adopting Programs had significantly lower case volume, such that the robotics colorectal learning curve was not surpassed. Factors contributing to low case volume in programs implementing the curriculum should be investigated further. Overall, while the APCRS robotics curriculum seems to standardize trainee console operative experience, case volume appears to be the primary limiting factor in training competent robotic colorectal surgeons.

ASSESSING PATIENT EDUCATION AND CONCERNS PRIOR TO SURGERY WITH OSTOMY CREATION.

P158

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Purpose/Background: In colorectal surgery, a temporary or permanent ostomy may be indicated for a variety of issues including inflammatory bowel disease, cancer, trauma, bowel obstruction, infection, diverticulitis, or fecal incontinence. Both temporary and permanent ostomies present new challenges to patients in the post-operative period: patients are tasked with learning how to manage their ostomies at home, and they are also faced with adjusting to a significant bodily change that influences their physical and social activities. Studies suggest that patient education for ostomy patients can improve quality of life and reduce care-related costs. However, there are few studies, and in particular there is a paucity of more recent literature that takes into account patients' increasing use of online and social media-based sources of information. We therefore aimed to assess concerns of patients undergoing surgery with ostomy creation, with particular attention to how patients learn about their ostomies prior to surgery.

Methods/Interventions: Patients who underwent surgery with ostomy creation at University Hospitals Cleveland Medical Center between June 2017–February 2018 were interviewed post-operatively about relevant medical history, concerns and challenges regarding their ostomies, and sources which patients found helpful for learning more about ostomy care as well as adjustment to life after surgery. Principles of grounded theory were applied to qualitative analysis of audio-recorded interviews so that as themes emerged, additional interview topics were identified, and linkages were developed, prioritized, and reorganized accordingly. This study received funding from the ASCRS Research Foundation in the form of a Medical Student Research Initiation Grant.

Results/Outcome(s): Ten patients who underwent surgery with either ileostomy or colostomy creation were interviewed between post-operative days one and five, depending on patient preference. Six female patients and four male patients were interviewed, with no significant difference in mean age between groups (54.8 years versus

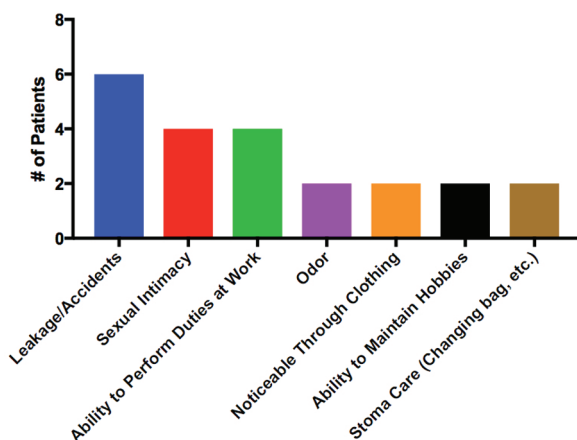
P157

	A1 (Veteran Programs: 2016-2017)	A2 (Veteran Programs: 2017-2018)	Adopting Programs: 2017-2018
Case/Fellow	45 (2-115)	47 (1-96)	19 (4-48)
Percentage console time	57.8%	59.5%	58.7%

age 44.5 years, $p=0.26$ by student's t -test). Patients underwent surgery for benign and malignant indications: Crohn's disease (3); rectal cancer (2); anal cancer (2); diverticulitis (2); and revision of previous recto-sigmoid anastomosis (1). In total, three patients received permanent colostomies, and seven patients received temporary loop ileostomies. Prior to surgery, three patients utilized internet-based resources to learn more about their ostomies; seven refrained from internet-based sources and relied on information and instruction from their doctors and nurses. All (100%) of patients felt pre- and post-operative education and instruction were thorough, and patients did not identify any topics that they felt were not covered sufficiently. Patients identified multiple concerns regarding their ostomies (Figure 1), and concerns did not correlate with age, gender, indication for surgery, or type of ostomy (permanent vs. temporary, ileostomy vs. colostomy).

Conclusions/Discussion: Patients undergoing surgery with either ileostomy or colostomy creation express a wide range of concerns related to their ostomies, including concerns about leakage/accidents, sexual intimacy, and ability to continue job-related duties and/or hobbies. In a cohort of ten patients at a single tertiary-care academic medical center, concerns did not correlate with age, gender, indication for surgery, or type of ostomy. Patients uniformly reported feeling satisfied with information provided and educational materials received in the pre- and post-operative settings. Of note, despite the increased use of internet-based resources in multiple medical and surgical fields, a majority of patients expressed disinterest in internet-based sources. Therefore, while it is important to maximize use of varied educational platforms to meet patient needs, it is equally necessary to assess which platforms patients utilize to enable clinicians to provide appropriate tools to educate and inform their patients. Future studies may be useful to better clarify the role of internet-based resources in educating patients and mitigating their concerns.

Figure 1: Common Patient Concerns



LONG-TERM ASSESSMENT OF A TARGETED INTERVENTION TO REDUCE INTRAOPERATIVE COSTS.

P159

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Purpose/Background: Previous data has shown that a targeted, education-based intervention on instrument choices for laparoscopic appendectomy results in a reduction in intraoperative costs over one year with no significant change in outcomes. However, whether these cost reductions are sustained long-term is unknown. In this study, we sought to determine whether surgeon education on intraoperative costs was associated with sustained cost savings.

Methods/Interventions: We collected individual surgeon instrument cost data during fiscal years 2013-2018 for 14 surgeons performing laparoscopic appendectomies at a four hospital health-system. At the conclusion of fiscal year 2013 (FY13), an educational intervention was performed targeting surgeons and operating room (OR) staff. We then analyzed changes in cost over time among individual surgeons and among the entire group. Exclusion criteria included cases that underwent open conversion, planned interval appendectomies, appendectomy as part of another operation, or appendectomies performed by surgeons not employed for the duration of the study. Statistical significance was determined using paired t -test.

Results/Outcome(s): A total of 2,605 laparoscopic appendectomies were performed between FY13 and FY18. During the fiscal year following the intervention, 11 of 14 surgeons had a $> 5\%$ reduction in average cost per case (FY13 \$1,221 vs. FY14 \$940, $p<.001$). When trending costs over 5 years, all surgeons in our cohort had a $>5\%$ reduction in average cost per case when compared to the pre-intervention FY13 year (Table 1). Overall mean cost decreased from FY13 to FY14 from \$1203 to \$966 ($p<.001$). This cost decrease was maintained from FY15-FY18 at \$971 ($p<.001$). This resulted in a total savings of \$87,397 in FY14 and \$400,490 in FY15-FY18. When examining the 11 surgeons who had an initial decrease in average cost per case, 2 had subsequent years with significant decreases in costs, 5 had subsequent years with no significant changes in costs, and 4 had subsequent years with significant increases in costs. All three surgeons who initially did not have a decrease in operative costs between FY13 and FY14 had subsequent years with significant decreases in operative costs.

Conclusions/Discussion: In this study, we demonstrate that a targeted educational intervention for surgeons and OR staff can significantly reduce costs for laparoscopic appendectomies long-term. All 14 surgeons in our cohort had reduced average operative costs during the 5 years following intervention, yielding significant savings for the health system. Given the focus of value-based care, these

results should be expanded to other procedures as a way to reduce costs while maintaining quality of care.

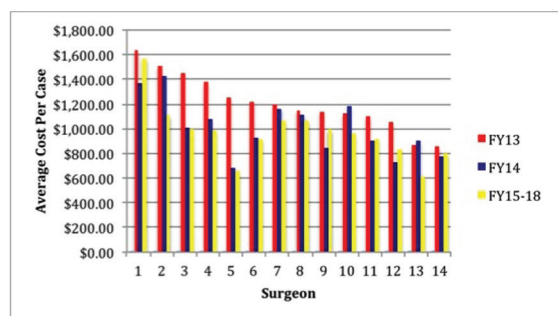


Table 1: Operative expenditures decreased following educational intervention

PERFORATED DIVERTICULITIS OF THE SIGMOID COLON CONTAINED WITHIN AN INGUINAL HERNIA SAC.

P160

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Purpose/Background: Incarcerated inguinal hernia and perforated sigmoid diverticulitis are two different disease processes commonly encountered by general surgeons. This case presents a rare finding of perforated sigmoid diverticulitis incarcerated in an inguinal hernia. The treatment options require consideration of a treatment dilemma – an inguinal hernia that requires repair but is at significant risk for wound sepsis and recurrence because of fecal contamination of the inguinal hernia. The lack of data describing this unique presentation and the multiple possible treatment options that lack literature consensus warrants investigation in an attempt to establish “Best Practices”. We report the 6th case of a perforated diverticulum in an inguinal hernia sac, and review five previously reported cases for treatment strategies and outcomes.

Methods/Interventions: A 61-year-old man presented to the emergency department from the primary care physician office with left testicular and groin pain. A scrotal ultrasound showed increased Color Doppler blood flow to bilateral epididymis, which appeared bulky and enlarged. These findings were concerning for bilateral epididymal-orchitis greater on the left. More importantly, the scrotal ultrasound was negative for testicular torsion. Computed tomography (CT) abdomen/pelvis with IV contrast revealed a left inguinal hernia containing a segment of proximal sigmoid colon with extensive diverticuli. There were multiple foci of free air within the hernia, suggesting perforation of the herniated segment of colon. There was no evidence of obstruction or pneumoperitoneum.

Results/Outcome(s): The patient was taken to the operating room for exploratory laparotomy. Examination of the left lower quadrant revealed an incarcerated hernia containing the proximal sigmoid colon. The incarcerated sigmoid segment showed areas of necrosis with some

fecal staining that was consistent with a perforation. A segmental sigmoid colectomy and end colostomy (i.e. Hartmann’s procedure) was performed. The inguinal hernia was copiously irrigated with saline but was not repaired because of fecal contamination of the hernia sac and risk for recurrence. Pathology showed multiple unremarkable diverticula that were intact and one diverticulum 3.5 cm from the proximal margin that had perforated through the bowel wall into adjacent peri-colonic fat. This was consistent with perforated diverticulitis with abscess. A complete colonoscopy will be performed 4 weeks prior to colostomy takedown. The left inguinal hernia will then be repaired in an open Lichtenstein fashion with synthetic mesh three months after colostomy reversal.

Conclusions/Discussion: In conclusion, the best treatment option for perforated diverticulitis incarcerated in an inguinal hernia requires consideration of the risk of surgical site infection and hernia recurrence. Though there is no consensus when considering case reports to date, it seems prudent to delay repair if there is significant fecal contamination of inguinal structures used for repair and to especially avoid mesh repair. Management of the perforated sigmoid diverticulitis in this setting includes resection of the diseased sigmoid colon with or without fecal diversion and is based on American Society of Colon and Rectal Surgeons practice guidelines.

COLORECTAL SURGICAL EDUCATION THROUGH TWITTER: EXTENDING THE CONVERSATION BEYOND THE OPERATING ROOM.

P161

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Purpose/Background: The growth of the social media platform Twitter has prompted many to consider its potential as an educational tool. Little is known about how this resource can be utilized by colorectal surgeons to augment clinical practice and enhance interactions with a broader audience. In this study, we sought to determine how a content driven hashtag (#QuickCase) could provide a mechanism to supplement surgical education.

Methods/Interventions: Weekly posts utilizing the #QuickCase hashtag were tweeted—inviting experts, trainees, and followers to participate in colorectal surgery case-based discussions. Tweets and responses were categorized according to thematic content and relevance to the discussion. Qualitative analysis of participant profiles were used to establish country of origin and occupation.

Results/Outcome(s): 19 original posts were evaluated during the sampling period (July 17, 2017-January 31, 2018). The majority of participants in the case based discussions were practicing surgeons or trainees (95%) from 19 countries. Each post generated considerable

engagement via retweets (6.5 ± 7.0) and replies (12.7 ± 13.2). All tweets were related to the case being discussed with greater than 90% of tweets covering thematic content related to clinical practice, critical appraisal of decision making, or supplementation of surgical education.

Conclusions/Discussion: Twitter-based case discussions are feasible and encourage inter-professional and international review of challenging colorectal cases.

ASSESSMENT OF RESEARCH CREATIVITY COMPETENCIES AMONG SURGICAL TRAINEES.

P162

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Purpose/Background: Research is key in to promote clinical advances in Colorectal surgery. There is an increasing interest in promoting *creativity* as an additional competency during training program in surgical specialties for its influence on research as well as on clinical practice. The aim of this study was to assess the baseline creativity skills of surgical trainees in a single-center university hospital. Characteristics associated to *creativity* and a comparison with medical specialties has been studied.

Methods/Interventions: An anonymous survey was distributed to a random selection of residents ($n = 40$). Questions included demographics as well as creativity assessment test. Self-scoring creativity/innovation effectiveness instrument has been used for this study. This instrument included an assessment of a selection of 7 competencies related to creativity (*1-Creative consciousness, 2-Levels of curiosity, 3-Pattern breaking skills, 4-Idea nurturing ability, 5-Willigness to experiment and take risks, 6-Courage and resilience levels and 7-Energetic persistence*). Each question had been scored from 1 to 5.

Results/Outcome(s): Forty residents (20 from surgical specialties and 20 from medical specialties) have been recruited for the study. We included 45% males, mean age 27.6 years old and 50% young trainees (first/second year). There were no significant differences in assessment of each creativity competence between surgical and medical trainees. In The overall series younger trainees scored less in *Idea nurturing ability* ($p=0.030$) and *Energetic persistence* ($p=0.027$). The *level of curiosity* ($p=0.017$) and *energetic persistence* ($p=0.039$) had correlation with age.

Conclusions/Discussion: There was similar level of creativity competencies among surgical and medical residents. Some changes on creativity competencies have been found related to age and year of training program.

COLORECTAL SURGICAL TRAINING IN ITALY: A STRATEGIC SURVEY OF THE YOUNG GROUP OF THE ITALIAN SOCIETY OF COLORECTAL SURGERY (Y-SICCR).

P163

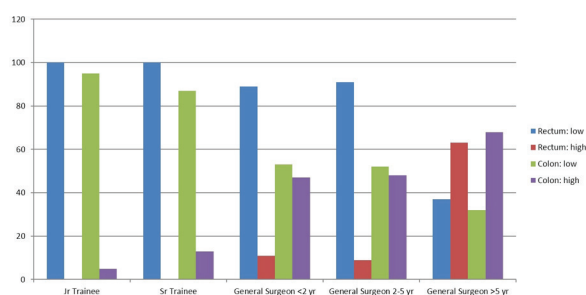
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Purpose/Background: Colorectal surgery requires a long training to ensure that trainees acquire basic skills and understand the principles of general surgery to develop the specific competence to treat patients with colorectal disease safely and effectively. Over the last years, many Italian trainees have moved abroad to continue their training, and many have decided not to return to Italy, even if this has meant restarting their training in a new country. This is presumably associated with difficulty in obtaining a proper training in colorectal surgery in Italy, where no dedicated training programs exist. The Italian Society of Colorectal Surgery (SICCR) endorsed a proposal from several young colorectal surgeons and trainees to create a group of young members of the Society forming the so called Y-SICCR. In March 2017, the Y-SICCR launched an online questionnaire with the aim of stating the perceived experience of the surgical and academic training they had had in colorectal surgery. It also aimed to identify areas which might require urgent improvement.

Methods/Interventions: An online survey was circulated via Social Media among Italian trainees and surgeons who had recently obtained general surgery specialisation. The open method of circulation made it impossible to determine the size of the entire population receiving the questionnaire and response rate. Nevertheless, the data were regarded to be of importance given the present state of surgical training in Italy. The key areas for the questionnaire were developed by the Y-SICCR committee members by means of teleconferences, and were agreed with the SICCR Council. The following domains were investigated: - Demographical data of the trainee (4 questions) - Data on surgical volume and diagnostic procedures performed (12 questions) - Data on perceived quality of surgical and academic training received (8 questions) - Data on engagement with scientific societies, Social Media and suggestions for improvement (20 questions) The questionnaire was delivered online with SurveyMonkey (SurveyMonkey Inc., San Mateo, California, USA, Main Website: www.surveymonkey.com), and responses anonymously recorded. The target population of respondents included residents and trainees in general surgery and young accredited general surgeons The number of procedures performed was cross-tabulated with gender, seniority of the responder (year of training or time since completion of the surgical specialisation program), geographical regions and age (divided in categories).

Results/Outcome(s): Answers were received from 122 surgeons. Their mean age was 34.1 ± 5.6 years and 77 (63%) of respondents were male. Most were working in Northern Italy (41%). Only 38% of respondents received formal program of training yearly. Fewer than 10% performed >100 procedures for colorectal cancer over the years of training. There were differences in number of procedures performed according to gender, geographical region and year of training. 22.5% of women trainees and 41.9% of men performed the colonic procedures as the operating surgeon ($p=0.055$), and 30% and 50%, respectively, as the assisting surgeon ($p=0.064$). The difference was statistically significant when assessing colorectal cancer surgery as operating surgeon (17.5% vs 40.3%) ($p=0.017$). Young surgeons from the Islands (mainly Sicily and Sardinia) (0%), the South (25.9%) and the Centre of Italy (27.3%) performed less colonic procedures as the operating surgeon than those in the North (46.5%) whereas all (100%) of respondents practicing abroad did so ($p=0.016$). By the end of training, none had operated on an adequate number (according to a standard general surgery trainee logbook) of patients with anorectal disease. More than half found their centre to be inadequate in training in inflammatory bowel disease. Eighty-six percent suggested that scientific societies should be involved in training. Half had undertaken postgraduate programs in colorectal surgery and 33% spent a period of training abroad. Around 54% of respondents did not use Social Media for work or scientific purposes and 80% was not using #colorectalsurgery hashtag, but 87% found remote training useful. Fifty-five percent were interested in obtaining the EBSQ diploma in Coloproctology.

Conclusions/Discussion: Italian training programs should ensure optimal exposure of trainees to colorectal and anal pathology. Societies need to cooperate to ensure that training is offered to all trainees at a consistent level. Y-SICCR will run a second questionnaire to assess the actual state of training among all Italian trainees, and take actions to fill the training gaps highlighted by the pilot survey.



Cross-table analysis. Logbook according to level of training. % of surgeons performing high or low number of procedures according to disease location (colon vs rectum) X axis = level of training (Jr: Junior, Sr: Senior) Y axis = % of respondents. Volumes variables were dichotomized into low vs high number of procedures based on the median of original ordinal variables

INTESTINAL ANASTOMOSIS TRAINING UTILIZING 3D PRINTED SIMULATED BOWEL OFFERS THE OPPORTUNITY FOR A LOW COST EFFECTIVE MASTERY LEARNING CURRICULUM.

P164

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Purpose/Background: Bowel anastomosis is a critical skill for a general surgery resident. While virtual reality simulations exist, most work in simulation for bowel anastomosis utilizes consumable physical models. Application of a Simulation Based Mastery Learning Theory (SBML) has proven to be a highly effective way to teach technical skills through simulation. In SBML, trainees must perform a task repeatedly until they achieve a measured endpoint of performance rather than a set practice time or set number of repetitions. This high repetition learning is often cost prohibitive when applied to consumable physical simulation models. Our objective was to create an economical consumable bowel model and then analyze the cost difference between a commercially available bowel model and the 3D printed bowel model during use in a SBML Curriculum.

Methods/Interventions: Through a partnership with the onsite 3D medical applications center, the National Capital Regional Medical Simulation Center has created a suitable, cost effective small bowel model to fulfill this need. Previous work involving surgeon focus groups has shown this printed bowel to be equivalent to purchased bowel for hand sewn and stapled anastomoses. We hypothesized that a SBML curriculum could be developed using 3 discrete tasks, seromuscular (Lembert suture placement), mucosal suture placement and stapled anastomosis. Based on our previous work with SBML curricula for technical skills, we estimated need for approximately 17 +/- 6 repetitions per task/ trainee. Thus, to complete all three tasks of the curriculum 51 +/- 18 repetitions/ trainee would be required. Assuming that two anastomoses could be performed on each piece of simulated bowel, approximately 25 +/- 8 pieces of bowel would be required/ trainee. The cost of the 3D printed bowel was \$1/unit, while the commercially available bowel was \$55/unit. We analyzed and compared the costs of training 5, 10, and 15 trainees using this curriculum.

Results/Outcome(s): Using the assumptions listed above, the average cost for 5, 10, 15 trainees to complete the curriculum greatly varied between the commercially available bowel and the 3D printed bowel. For the 3D printed bowel, average cost to reach proficiency for 5 residents was \$125 +/- \$40, for 10 residents was \$250 +/- \$80 and for 15 residents was \$375 +/- \$120. For the commercially available bowel these numbers were significantly higher at \$6,875 +/- \$2,200 for 5 residents, \$13,750

+/- \$4,400 for 10 residents, and \$20,625 +/- \$6,600 for 15 residents.

Conclusions/Discussion: Through a partnership with the onsite 3D medical applications center we have created a suitable 3D printed small bowel model that will allow us to create a Simulation Based Mastery Learning curriculum. Based on our calculations, we will be able to teach our residents safe bowel anastomosis skills while also saving an average of \$1,350 per learner equaling \$20,250 per 15 learners.

HOW TO GET AHEAD: YOUNG COLORECTAL SURGEONS REFLECT ON THEIR FIRST FEW YEARS IN PRACTICE.

P165

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Purpose/Background: The transition from surgical training to surgical practice is a critical one. However, in our current surgical training model, there is no formalized curriculum regarding how to navigate this transition successfully. Residency and fellowship instruct trainees in surgical skills and patient care, but they often lack instruction in practice building or early career development. Because of this, many young surgeons are left with very little information about how to progress their career once out of the confines of their training programs. This study sought to identify and characterize young colorectal surgeon beliefs about professional development and early clinical practice.

Methods/Interventions: Semi-structured interviews were performed with board-certified colorectal surgeons 2-7 years after completion of CRS residency. Responses were qualitatively analyzed and converted to coded, categorizable data. Subjects were recruited via a snowball sampling method.

Results/Outcome(s): Twenty-two colorectal surgeons currently employed in 14 states and one foreign country were interviewed. 45% were female. Surgeons described their current practice environments as academic (77%), private practice (18%), and military (5%). Of the group, 86% of surgeons were happy with their career progression, 82% were happy with their current operative volume, and 82% were happy with their current mix of cases. Surgeons identified a number of strategies they used to improve their career progression. These strategies congregated into three main types: those used during the job search (14%), those employed once at an institution (39%), and those independent of a specific job or institution (53%). Only 14% of the strategies identified pertained to the job search: they included contract negotiation (2 comments), academic/clinical balance (2), research support (2), and finding supportive partners/bosses (6). Strategies employed on the job within their institution included research (9),

networking (8), teaching (3), institutional involvement (3), and providing quality care (2). Strategies used outside of their institution included ASCRS involvement (13), obtaining mentorship outside of their current employment (4), journal involvement (3), embracing new technology (2), and obtaining further education (2). For those who were unhappy with their career progression (14%), the biggest barriers identified were a lack of mentorship in their current job and practicing in a competitive and oversaturated market. For those who were happy with their career progression (86%), the biggest barrier to career progression identified was time (10 comments). Three out of the 22 surgeons had changed jobs since their initial hire. In regards to case mix, less than half of surgeons (45%) believed they had any control over their case mix. Those who did report having any control over case mix primarily noted the ability to direct certain referrals (pelvic floor or sacral nerve stimulation) to partners in their groups with special expertise. Only one surgeon described a group situation where they could limit their practice to the types of cases they preferred to perform. Lastly, when asked whether a surgeon required a certain case mix to succeed, surgeons were split as to whether a broad range of cases (50%) or specializing in one particular niche (50%) was more effective for career advancement.

Conclusions/Discussion: Young colorectal surgeons were for the most part content with their career advancement, operative volume, and operative case mix. They employed a variety of strategies to promote their own career progression and practice development. The majority of these strategies focused on activities performed after obtaining a job (rather than job factors identified during the job search). However, the biggest barriers to career advancement were lack of local mentorship, a competitive/oversaturated health care market, and time to perform the parts of their job that would lead towards promotion. All of which, potentially, could be avoided or negotiated during the job search process. Given this information, young surgeons should identify the factors they feel will be responsible for their success ahead of the job search and explicitly prioritize them.

PARTICIPATION IN A TATME COURSE FACILITATES ADOPTION OF THE TECHNIQUE.

P166

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Purpose/Background: Low rectal cancer presents a myriad of challenges for the colorectal surgeon. Specifically, the technical complexities in navigating the pelvis while ensuring an oncologically sound operation and balancing functional outcomes for patients has driven the shift towards sphincter-preserving techniques. Transanal total

mesorectal excision (taTME), as first described at Florida Hospital, was developed for difficult mid and low rectal tumors. The taTME surgical technique and steps are demanding and require a relatively long learning curve. A study at our hospital demonstrated that 36-51 cases were needed to proficiently obtain a pathologically adequate TME specimen. Additionally, there exists the potential of TaTME-specific complications such as urethral injury, nerve damage, pelvic side-wall injury and sphincter damage. Given the technical challenges and nuances in avoiding associated complications the need for training in this technique became paramount. In 2014, the first taTME course at Florida Hospital was implemented as a training curriculum consisting of didactic lectures, online modules, live surgery and hands-on cadaver-based training together with on-site proctoring to help surgeons safely implement taTME and to shorten the learning curve. The goal of our study was to assess the 5-year follow-up data of surgeons who participated in our taTME course.

Methods/Interventions: To date, 258 surgeons had taken the taTME course at Florida Hospital since its inception in 2014. An online survey was conducted where participants that have taken the taTME course at Florida Hospital. Participants were asked about their pre-course and post-course experience with the taTME technique. Our primary end point was to determine what is the average adoption rate of taTME. Our secondary endpoints include participants' perceived confidence level with the surgery, related complications, limitations of adopting the TaTME approach, and population demographics pertaining to rectal cancer in their area.

Results/Outcome(s): There are 68 surgeons who have participated in the survey thus far, of which 40 (60.6%) came from academic hospitals and 26 (39.4%) from community hospitals. The median numbers of rectal cancer cases seen by the surgeons was 3 (IQR: 3-4). The median numbers of TME and TEM/TEO/TAMIS performed by the surgeons were 3 (IQR: 3-4) and 2 (IQR: 1-3) respectively. Forty-three (63.2%, 95% CI: 50.9%-74.0%) of the surgeons stated that they increased TME performance after the course. The average confidence index of TME performance increased from 1.06 (SD: 0.90) to 2.42 (SD: 0.82) (pairwise t-test, $p < 0.001$). The TME adoption rate increased from 39.7% to 77.9% (McNemar test, $p < 0.001$).

Conclusions/Discussion: Our current 5-year follow-up data on surgeons who have participated in the taTME course and survey demonstrates that adoption rates significantly increased as a result of participation in the course. In addition, participants felt that inadequate technique was the greatest limiting factor in adopting the technique, which was circumvented by taking the course. A majority of participants also noted that a refresher course was not needed. The taTME course clearly demonstrated increase in confidence in performing the technique and, perhaps, should be offered to more colorectal surgeons to facilitate adoption of the technique.

TRANS-ANAL STRICTUREPLASY: A NOVEL APPROACH TO A RELATIVELY COMMON PROBLEM.

P167

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Purpose/Background: Despite the advances in the surgical techniques and technology in colorectal surgery, the development of colorectal anastomotic stricture following left sided colon resection is a common problem. In some case series the incidence is estimated to be as high as 30%, some of the known risk factors for developing a stricture include anastomotic leak and ischemia. Treatment options range from frequent dilation using fingers and dilator if the stricture is low or frequent endoscopic balloon dilations, unfortunately multiple sessions may required to achieve adequate result, here we presents a case report and describe a novel approach for this common problem.

Methods/Interventions: Postoperative development of colorectal anastomotic stricture is a common complication with a range of 0-30%. Colonic stricture is a bowel obstruction of the enteric system characterized by the inability to pass a 12-mm proctoscope or a larger 19-mm rigid sigmoidoscope through it. Procedures like colostomy, colonic resection, colorectal endoscopic submucosal dissection and radiation enteritis could lead to the development of these strictures. A stricture may result from multiple risk factors like inflammation, tissue ischemia, or radiation of the colonic tissue.⁶ Risk is noted to be higher in stapled versus handsewn colorectal anastomosis. The rate of developing stricture in stapled colorectal anastomosis is about 8% compared to 2% when it is a handsewn anastomosis. Presentation of strictures depends on location and severity. The most common presentation of a colonic stricture is altered bowel habit that could be associated with localized pain to the area of obstruction. If the stricture is complete, there is will be no passage of stool or flatus risking bowel perforation if no intervention is performed in a timely manner.

Results/Outcome(s): Management of strictures depends on the patient condition during the time of his or her presentation. when surgical intervention is contemplated the etiology and location of the stricture should be considered. If the original resection procedure was done for a malignant process, the risk of tumor recurrence should be investigated and tissue biopsy is recommended prior to any intervention. If the resection was performed for benign disease and the location of the stricture is distal defined as narrowing within 10 Centimeters of the anal verge, the stricture can be effectively treated with frequent dilatation using fingers or dilators of different sizes. However, if the stricture is located higher up, endoscopic balloon dilatation can a viable option with very high success rate. However Endoscopic dilatation requires the ability to pass a guide

wire through the narrowed segment of the colon under fluoroscopic guidance, Very minimum morbidity are associated with this procedure. Complications of endoscopic dilatation based on rate of occurrence include (restenosis, perforation and abscess formation). Other methods can be used if dilatation is unsuccessful include a metallic stent that can be deployed across the area of stricture to keep the colon open. Conventional surgical approach whether laparoscopic or open offer long term cure, surgical options include complete resection and revision of the anastomosis or strictuoplasty, higher morbidity and mortality are associated with anytype of transabdominal surgical approach and the risk of stoma should not be underestimated especially in unprepared bowel.

Conclusions/Discussion: Another option is a surgical resection of the stricture (strictureplasty) via transanal approach as described above. We believe our approach can be safe and as effective as the open or laparoscopic transabdominal surgical approach provided we are dealing with favorable anatomy and stricture within our stapler reach.

INCIDENCE AND PROGNOSIS OF PULMONARY METASTASIS IN COLORECTAL CANCER STRATIFIED BY PRIMARY TUMOR LOCATION AT INITIAL DIAGNOSIS: A SEER-BASED STUDY.

P168

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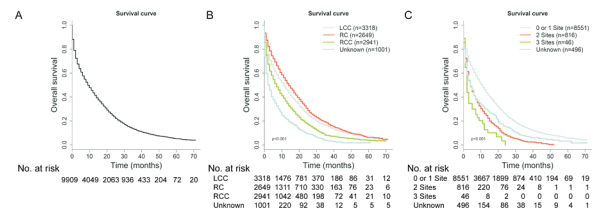
Purpose/Background: To examine the effect of primary tumor location on the incidence and the prognosis of colorectal cancer (CRC) patients with pulmonary metastasis at initial diagnosis.

Methods/Interventions: From Surveillance, Epidemiology, and End Results (SEER) database, 9 920 out of 192 969 CRC patients were identified with pulmonary metastasis at diagnosis between 2010 and 2015. Patients were classified into three subsets according to primary tumor location. The incidence of pulmonary metastasis and median survival were calculated. Multivariable logistic and Cox regression were performed to identify the risk factors of pulmonary metastasis and prognosis.

Results/Outcome(s): The overall incidence of pulmonary metastasis was 5.14% (9 920/192 969) in the entire CRC cohort and 25.66% (9 920/38 660) in metastatic CRC (mCRC) patients. The median survival of CRC patients with pulmonary metastasis at initial diagnosis was 10 months. Stratification of the data by different primary tumor location revealed that rectal cancer patients exhibited the highest incidence of pulmonary metastasis (6.42%, 2 650/41 251, in all rectal cancer patients; 36.55%, 2650/7250, in metastatic rectal cancer patients), while they had the longest median survival (15 months). Right-sided colon cancer patients had the lowest incidence of pulmonary metastasis (3.68%, 2 944/79 911, in all right-sided

colon cancer patients; 20.38%, 2 944/14 445, in metastatic right-sided colon cancer patients), while exhibited the shortest median survival (8 months). The risk factors for both the incidence and prognosis were identified to be 61 to 80 years old, over 80, black, 2 or 3 extrapulmonary metastatic sites, and CEA-positive.

Conclusions/Discussion: We highlighted the impact of primary tumor location on the incidence of pulmonary metastasis and prognosis of CRC patients. Our work revealed the incidence of pulmonary metastasis and median survival of CRC patients with primary tumors at different locations. For CRC patients with pulmonary metastasis, primary tumor location should be taken into consideration in clinical practice and personalized treatment.



A. Overall survival of CRC patients with lung metastasis.

B. Survival of CRC patients with lung metastasis stratified by primary tumor location. Abbreviations: LCC, left-sided colon cancer; RCC, right-sided colon cancer; RC, rectal cancer.

C. Survival of CRC patients with lung metastasis stratified by the extent of extrapulmonary metastatic disease. Extent of extrapulmonary metastatic disease is classified by the number of metastatic sites (brain, bone, or liver).

WHO IS AT GREATEST RISK FOR INCISIONAL HERNIA AFTER LOOP ILEOSTOMY CLOSURE?

P169

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Purpose/Background: There is wide variation amongst the literature in the reported rate of hernia after ileostomy closure. Given the significant heterogeneity in existing data with regards to risk factors for hernia, our aim was to determine the rate of hernia occurrence after closure of a loop ileostomy and attempt to identify any perioperative risk factors that may be associated with hernia development.

Methods/Interventions: Using billing data with Current Procedural Terminology codes we identified a retrospective cohort that included all patients who underwent loop ileostomy formation and closure over a 3-year time frame at a single institution among a group of 7 colorectal surgeons. The primary outcome was identification of hernia on either physical exam or via abdominal imaging. Each case was individually queried to identify patient co-morbidities, presence of previous hernia surgery, follow-up time and presence of the primary outcome. A stepwise logistic regression analysis was used to determine predictors of ileostomy site hernia.

Results/Outcome(s): From January 1, 2012 to December 31, 2014 data were collected on 243 patients that had formation of a loop ileostomy and subsequent closure. The overall rate of hernia formation was 11.9% (29/243). The median time to discovery of the hernia was 16.4 (range: 2.2-55.9) months with a median follow up time of 49 months. Although loop ileostomy performed in conjunction with sigmoidectomy for diverticulitis consisted of only 19% of ileostomy cases, 62% of hernias (18/29) were identified in this cohort. Rates of hernia formation increased with respect to body mass index (underweight 0%; normal 4.6%; overweight 13.8%; obese 21%). The multivariable model identified increased BMI (underweight/normal weight vs overweight: OR 4.13, 95% CI 1.06-16.04; underweight/normal weight vs obese: OR 8.74, 95% CI 2.17-35.23) and surgical indication (reference variable: diverticulitis; rectal cancer: OR 0.21, 95% CI 0.06-0.76; Crohn's/ulcerative colitis: OR 0.06, 95% CI 0.01 – 0.53; other: OR 0.15, 95% CI 0.04-0.64) as significant predictors of ileostomy site hernia.

Conclusions/Discussion: The development of a hernia at the site of loop ileostomy closure was influenced most by BMI and surgical indication. Identifying such a high-risk cohort is essential in considering future studies for those who may benefit from a prophylactic intervention at the time of ileostomy closure.

THE EFFECT OF NEOADJUVANT RADIOTHERAPY ON FAECAL INCONTINENCE, LOW ANTERIOR RESECTION SYNDROME AND ANAL MANOMETRIC FINDINGS AFTER TOTAL MESORECTAL EXCISION.

P170

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Purpose/Background: Neoadjuvant chemoradiation is vital in the multi-disciplinary treatment for rectal cancer. However, it may adversely affect the anal sphincter function. The aim of this study was to objectively quantify the effect of neoadjuvant radiotherapy on the postoperative anal function in patients undergoing total mesorectal excision for rectal cancer.

Methods/Interventions: Patients who underwent total mesorectal excision for rectal cancers were evaluated with questionnaires on Wexner score, low anterior resection syndrome (LARS) score and anal manometry. They were evaluated at 3 months after surgery or stoma closure, whichever was later. The scores and anal manometric findings were compared between those who had neoadjuvant chemoradiation and those who had upfront surgery.

Results/Outcome(s): A total of 28 patients were evaluated. 57.1% and 42.9% had upfront surgery and neoadjuvant chemoradiation therapy respectively. The two groups were comparable in terms of age, gender ratio,

tumor height and anastomotic height. Patients who had neoadjuvant chemoradiation had significantly higher median Wexner score, 14.5 vs 6 ($p=0.043$), significantly greater intra-rectal pressure during push (attempted defecation), 50.25mmHg vs 34.65mmHg ($p=0.008$), significantly lower rectoanal pressure differential during push, -0.6mmHg vs -23.95mmHg ($p=0.031$) and significantly lower rectal compliance during balloon inflation 0.03 vs 0.13 ($p=0.021$). The LARS score, resting sphincter pressure and squeeze sphincter pressure were comparable between the two groups.

Conclusions/Discussion: Neoadjuvant chemoradiation resulted in greater intra-rectal pressure and lower rectoanal pressure differential during attempted defecation. Patients were more likely to have fecal incontinence but the severity of LARS was comparable.

LAPAROSCOPIC APPROACH TO MALIGNANT COLONIC OBSTRUCTION IMPROVES SHORT TERM MORBIDITY & MORTALITY.

P171

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Purpose/Background: We hypothesized that a laparoscopic approach to urgent colectomy for colonic obstruction would be associated with less morbidity & mortality, shorter hospitalization length, and longer operative time, with similar mortality compared to open colectomy. We compared the outcomes of laparoscopic and open approaches of emergency colectomy for colonic obstruction from colonic cancer using data from the National Surgical Quality Improvement Program (NSQIP) data base for the period 2012 - 2016.

Methods/Interventions: Multivariate analysis compared NSQIP data points following laparoscopic, laparoscopic converted to open and open colectomy for emergency colectomy for colonic obstruction from colon cancer for 2012 to 2016.

Results/Outcome(s): In NSQIP hospitals, 680 patients underwent emergency colectomy for colon obstruction from colon cancer in the time period 2012-2016. Overall, 26% of patients had sigmoid cancer, 17.5% ascending colon cancer, 16% cecal cancer, 13.5% transverse colon cancer, 6% splenic flexure cancer, 9.6% descending colon cancer, and 6.5% rectosigmoid junction cancer. Surgeons within NSQIP hospitals used a laparoscopic approach for colonic obstruction in 18.9% of operations without significant increase during the period 2012-2016. The NSQIP data demonstrated, after risk adjustment, that a laparoscopic approach to these obstructing colonic cancers was associated with lower mortality (4.7% vs.10%, AOR: 0.39, $P=0.04$), lower morbidity (39.8% vs. 49.9%, AOR: 0.64, $P=0.04$), and shorter hospitalization length (mean

difference: 4 days, $P < 0.01$) than an open approach (See Table 1). However, the median duration of operation was longer in laparoscopic operations than open operations (147 min vs. 119 min, $P < 0.01$).

Conclusions/Discussion: During the time period of this national study, overall morbidity and mortality for surgical management of colonic obstruction did not change. Yet, in the sub-group treated laparoscopically, there was a significant advantage over open approaches. This suggests that efforts should be directed towards increasing the availability of laparoscopic approaches for the surgical treatment of colonic obstruction.

Table 1: Mortality and Morbidity of patients treated for colonic obstruction by surgical approach and site of the colonic cancers.

		Planned Open	Laparoscopic overall	Successfully completed Laparoscopic	Converted to open
Ascending colon	Mortality	10.1%	4.9%	2.2%	12.5%
	Morbidity	51.3%	39.3%	37.8%	43.8%
Transverse colon	Mortality	13.5%	16.7%	7.1%	50%
	Morbidity	45.9%	38.9%	28.6%	75%
Descending colon	Mortality	11%	0	0	0
	Morbidity	56%	33.8%	25%	66.7%
Sigmoid colon	Mortality	6.6%	0	0	0
	Morbidity	44.7%	43.5%	25%	87.5%
Rectosigmoid colon	Mortality	15.2%	0	0	0
	Morbidity	57.6%	45.5%	44.4%	50%
All operations	Mortality	10%	4.7%	2.1%	12.5%
	Morbidity	49.9%	39.8%	33.3%	59.4%

IMPACT OF AURICULAR NEUROSTIMULATION IN PATIENTS UNDERGOING COLORECTAL SURGERY WITH AN ENHANCED RECOVERY PROTOCOL: A RANDOMIZED, CONTROLLED TRIAL.

P172

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Purpose/Background: Narcotics are the cornerstone of postoperative pain control, but the opioid epidemic and the negative physiologic and psychologic effects of narcotics implore physicians to utilize non-pharmacologic methods of pain control. This pilot study investigated a novel neurostimulation device for postoperative analgesia. We hypothesized that active neurostimulation would decrease postoperative narcotic requirements.

Methods/Interventions: This placebo-controlled, double-blinded trial included adult patients who underwent elective bowel resection between December 2016 and April 2018. Patients were randomized to receive an active or inactive (sham) device, which was applied to the right ear prior to surgery and continued for 5 days. The primary outcome was total opioid consumption; secondary outcomes included pain, nausea, anxiety, return of bowel function, complications, 30-day readmissions, and opioid consumption at 2 weeks and 30 days.

Results/Outcome(s): 57 patients participated and 5 withdrew; 52 patients were included in the analysis.

Twenty-eight patients received and active device and 24 received an inactive device. There was no difference in total narcotic consumption between active and inactive devices (90.79 ± 54.93 vs 90.30 ± 43.03 oral morphine equivalents [OME]/day). Subgroup analyses demonstrated a benefit for patients after open surgery ($p = 0.0278$). When patients were stratified by decade, those 60-70 and >70 years derived a benefit from active devices as compared to those aged 30-40, 40-50, and 50-60 ($p = 0.01092$). There were no serious adverse events related to this study.

Conclusions/Discussion: Overall, no difference in opioid use was found with auricular neurostimulation. However, this pilot study indicates that older patients and those with larger abdominal incisions may benefit from auricular neurostimulation. Further investigation of this novel mode of analgesia in these groups may be necessary.

CAN A NON-ROBOTICS PROGRAM ACHIEVE THE SAME CLINICAL OUTCOMES FOR ROBOTIC COLON SURGERY?

P173

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Purpose/Background: Robotic technology has been lauded as a minimally invasive method to perform colon and rectal surgery that may decrease some of the technical limitations of laparoscopy. Most of the data available in the literature on outcomes after robotic surgery come from national databases or from high-volume centers with dedicated robotic operating room teams and first-assistant. We feel that there is a dearth of data showing outcomes for robotic surgery at community centers which may be lacking in robotic experience at a systems level and unable to provide the dedicated operating room team that is available at a high-volume robotic center. The purpose of our study is to demonstrate that robotic surgery can have equivalent safety and efficacy outcomes in a community setting as those seen in high-volume centers.

Methods/Interventions: This is a retrospective chart review over 36 month period performed by 2 board certified colon and rectal surgeons at a 221-bed suburban community hospital in the Atlanta Metropolitan area. A total of 87 patients who underwent 89 robotic colon and rectal surgical procedures between September 2015 and August 2018 were included. The main study measures were overall complication rate, mortality and hospital length of stay.

Results/Outcome(s): Average length of stay was 4.20 days with a median of 3. There were a couple of outliers that increased the average: one being 21 days another 31 days. Our 30 day mortality was 0. Our overall complication rate was 20.2%

Conclusions/Discussion: Robotic colorectal surgery can be safely performed by trained colon and rectal surgeons in smaller volume centers. Our overall complication rate was 20.2% consistent with national averages of 19- 21.7%. Our average and median length of stay was 4.2 and 3 days respectively compared to the reported national averages of 4.4-5.2 days. This may serve as encouragement for those hesitant to start performing robotic colorectal surgery due to the small size of their institution.

A PROPENSITY-MATCHED COMPARISON OF ROBOTIC, LAPAROSCOPIC AND OPEN COLORECTAL SURGERY IN COLORECTAL CANCER.

P174

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Purpose/Background: Introduction: As the availability and use of robotic surgery increases, retrospective data suggest that outcomes may be comparable to conventional surgery. However, there is ongoing debate regarding benefits of minimally invasive techniques for colorectal cancer surgery. Aim: We utilized propensity matching to compare clinicopathologic and perioperative outcomes of patients underwent curative intention resection for colorectal

cancer by open, laparoscopy and robotic surgery at a single institution. We aim to clarify that robotic colorectal surgery can be a safe, feasible option even at a non-academic institution.

Methods/Interventions: Methods: All patients between January 2010 till June 2018 who underwent elective colorectal resection for colorectal cancer were identified. Patients were divided into three groups based on initial operative approach: open, laparoscopic and robotic surgery. After the exclusion of Stage IV or incomplete data, there were total 906 cases including 200 rectal cases. Clinicopathologic and 30-day clinical outcomes were compared between groups with and without propensity matching. Sub analysis of rectal cancer was also performed. Statistical analysis was performed using R programming language version 3.3.2 (The R Project for Statistical Computing) and SPSS® Statistics 25 software (IBM, Inc., Armonk, NY, and U.S.A.). A p value <0.05 was considered statistically significant.

Results/Outcome(s): Results: There were 187 robotic (20.6%), 421 laparoscopic (46.3%) and 298 open (32.8%) colorectal surgeries. After propensity score matching, there were 230 robotic, 253 laparoscopic and 298 open surgeries matched and all covariates including gender, age, BMI, ASA, past surgical history, site of cancer, tumor size, histological grade, T, Stage, neoadjuvant chemotherapy and neoadjuvant radiation were balanced. In comparison with laparoscopic surgery, robotic surgery was associated with

P172 Subgroup analysis

Variable	Active Device		Inactive Device		P-value
	N	OME/day	N	OME/day	
Gender	14	98.97 ± 66.19	15	100.73 ± 51.11	0.711
Male	14	82.60 ± 44.42	9	72.92 ± 20.86	0.780
Female					
BMI	16	96.36 ± 64.66	17	90.81 ± 48.82	0.928
< 30	12	83.35 ± 43.29	7	89.05 ± 32.30	0.646
> 30					
Age (years)	4	142.64 ± 70.24	1	124	0.011
< 40	2	135.53 ± 59.21	3	104.71 ± 1.94	
40-50	10	94.82 ± 44.88	5	100.87 ± 53.01	
50-60	10	69.80 ± 47.40	6	103.92 ± 58.80	
60-70	2	27.08 ± 19.55	9	66.80 ± 30.56	
> 70					
Mode of Operation					
Open	2	29 ± 1.70	7	84.95 ± 27.22	0.028
HAL/Robotic	26	95.54 ± 55.23	17	92.5 ± 49.80	0.992
Smoking status					
Never smoker	13	90.12 ± 60.12	13	110.03 ± 45.27	0.280
Present/past smoker	11	105.06 ± 50.41	7	69.94 ± 21.80	0.085
Diagnosis					
Cancer/polyp	17	73.19 ± 50.37	12	76.69 ± 33.47	0.441
Benign disease	11	117.98 ± 55.21	12	103.91 ± 50.12	0.562

further minimal distance to margin (median, interquartile Range IQR, p) (2, 3.9 vs 1.1, 3.2; p=0.016), similar number of harvested lymph nodes (23, 12.6 vs 20, 13; p=0.083), longer operating time (230, 105 vs 155, 96.5; p<0.001), less estimated blood loss (100, 54.9 vs 100, 100; p=0.039), lower morbidity (7.4% vs 15.4%, p<0.05). In comparison with open surgery, robotic surgery was associated with further minimal distance to margin (2, 3.9 vs 1, 2.7; p<0.001), higher number of harvested lymph nodes (23, 12.6 vs 19,11; p<0.001), longer operating time (230, 105 vs 131.5, 105; p<0.001), less estimated blood loss (100, 54.9 vs 150, 150; p<0.001), lower morbidity (7.4% vs 37.2%, p<0.05). At a mean follow up of 36.9 months, there was no significant difference with respect to recurrence rate, local recurrence among robotic, laparoscopic and open group. In sub-analysis for proctectomy in rectal cancer, histologic grade, T, neoadjuvant chemotherapy and neoadjuvant radiation were significantly different across the 3 surgical techniques. However, after propensity score matching there were no difference among robotic, laparoscopic and open proctectomy. There was no significant difference for minimal distance to margin, number of harvested lymph nodes, anastomotic leak and morbidity. In comparison with open, robotic proctectomy decreased length of stay (4, 2 vs 6, 4; p<0.001), estimated blood loss (150, 100 vs 300, 325; p<0.001). In comparison with laparoscopic, robotic proctectomy had longer operating time (300, 162.2 vs 231.3, 153.3; p=0.047). At a mean follow up of 36.9 months, there was no significant difference with respect to recurrence rate (14.4% vs 10.8%, p=0.44), local recurrence (3.6% vs 1.1%, p=0.39). Robotic proctectomy was more likely to reserve for patient with early stage (pathologic stage 1, 2) (robotic 65.2% vs laparoscopic 36.5% %, p=0.002, open 34.8%, p=0.007).

Conclusions/Discussion: Conclusion: In a carefully matched cohort of colorectal resections for colorectal cancer, we demonstrated that robotic colorectal surgery decreased length of stay and blood loss. We also proved that robotic colorectal surgery at a non-academic institution is safe, feasible and oncologically sound with short-term outcomes comparable to laparoscopic and open technique. However, further analysis will be required to better define its optimal role in colon and rectal surgery.

OUTCOMES OF RADIATION THERAPY FOR SQUAMOUS CELL CANCER OF THE RECTUM, AN OBSERVATIONAL STUDY UTILIZING THE NATIONAL CANCER DATABASE.

P175

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Purpose/Background: Previous studies have associated squamous cell cancer of the rectum with a poor prognosis even when treated with multi-modal therapy. The purpose of the analysis is to evaluate the benefits of different

radiation doses in conjunction with chemotherapy and surgical management to optimize overall survival following diagnosis of squamous cancer of the rectum.

Methods/Interventions: The National Cancer Database (NCDB) was queried for cases of aggressive Squamous Cell Cancer of the Rectum between 2004 and 2014 based on primary site (C209) and SEER histology code (807). NCDB oncologic information, comorbidity score and demographic factors were utilized to risk stratify cases. The primary outcome was overall survival based on radiation therapy dose and need for salvage surgery.

Results/Outcome(s): The inclusion criteria identified 1970 cases of squamous cell cancer of the rectum who received radiation therapy as part of their treatment course. Within this group, 94.7% also had chemotherapy while only 24.4% underwent surgery. Radiation dosing was stratified to those receiving: less than 45Gy (11.5%, n=227), between 45Gy and 50.4Gy (15.4%, n=303), between 50.4Gy and 54Gy (17.6%, n=347) and greater than 54Gy (55.5%, n=1093). Kaplan-Meier testing indicated and expected increase in overall survival for those who underwent surgery in addition to chemotherapy and radiation (107 vs. 90 months) versus chemo/radiation alone. However, within the cohort of those who underwent chemotherapy and radiation alone (n=1490), overall survival was increased for those receiving greater doses of radiation less than 45Gy (61 month), 45- 50.4Gy (81 month), 50.4 – 54Gy (93 month) and greater than 54Gy (96.6 month) (log-rank value 69.03, p<0.001). After controlling for differences in age, stage, comorbidities and demographics, Cox Regression analysis identified a reduction in hazard for mortality for non-surgical candidates receiving escalating doses of radiation therapy exceeding 45Gy (Table 1).

Conclusions/Discussion: Most providers treat advanced squamous cell cancer of the rectum with chemotherapy and radiation. This analysis suggests an improved overall survival when radiation doses exceed 50.4Gy compared to the standard 45Gy.

Cox Regression for Survival Following Diagnosis of Squamous Cancer of the Rectum	OR	95% CI	P
Age (Decade, Years)	1.28	1.20 to 1.361	<0.001
Charlson Deyo Score (Versus Score of Zero)			
CDCC 1	1.29	1.04 to 1.61	0.02
CDCC 2	2.18	1.50 to 3.16	<0.001
CDCC 3	2.11	1.45 to 3.07	<0.001
NCDB Analytic Stage (Versus Stage 1)			
Stage 2	1.83	1.47 to 2.27	<0.001
Stage 3	1.92	1.55 to 2.37	<0.001
Stage 4	5.78	4.52 to 7.39	<0.001
Surgical Intervention	0.80	0.67 to 0.97	0.024
Chemotherapy	0.57	0.43 to 0.75	<0.001
Radiation Dosage (Versus Less than 45GY)			
45 to 50.4Gy	0.62	0.48 to 0.80	<0.001
50.4 to 54Gy	0.473	0.36 to 0.62	<0.001
Greater than 54Gy	0.476	0.39 to 0.59	<0.001

Table 1: Cox regression modeling for hazard of mortality following diagnosis and treatment of squamous cancer of the rectum. There is an expected increase in hazard for mortality with increasing age and comorbidity index but a significant reduction in hazard for mortality with escalating radiation dosing that plateaus after 54Gy.

THE PROGNOSIS OF ADENO, ADENOSQUAMOUS AND SQUAMOUS CARCINOMAS OF THE COLON AND RECTUM, A NATIONAL CANCER DATABASE OBSERVATIONAL STUDY.

P176

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Purpose/Background: Adenosquamous carcinoma of the colon and rectum is a rare and nefarious condition compared to adenocarcinoma and squamous cell carcinoma of the colon and rectum. The purpose of this analysis was to benchmark the prognosis of patients diagnosed with adenosquamous carcinoma of the colon and rectum.

Methods/Interventions: The National Cancer Database (NCDB) was queried for cases of aggressive adeno, squamous and adenosquamous carcinoma of the colon and rectum between 2004 and 2014 based on SEER histology codes (8140, 8070, 8560). NCDB oncologic information, comorbidity score and demographic factors were utilized to risk stratify cases. The primary outcome was overall survival following diagnosis based on treatment regimens.

Results/Outcome(s): 529941 cases were identified: 99.4% adeno, 0.5% squamous (n=2679), and 0.1% adenosquamous (n=388). The numbers of patients diagnosed with metastatic spread at the time of diagnosis was significantly higher in those with adenosquamous (35.6%) versus adeno (20.5%) or squamous (15.5%, p<0.001). Cases of adeno or adenosquamous were more likely to have an oncologic resection (86.4% and 83%) versus those with squamous pathology (14.4%, p<0.001). Kaplan Meier testing indicated the average survival following diagnosis of adeno (84.8 months), squamous (87.7 months) was significantly longer than adenosquamous (57.8 months, Log Rank value 106.6, p<0.001). After controlling for difference in the cohorts, Cox regression failed to identify a increased hazard for mortality for squamous versus adeno (p=0.172) but a significant detrimental impact when adenosquamous pathology is present (OR 1.877, CI 1.66 to 2.12, p<0.001). Patients able to undergo an oncologic resection had decreased hazard for mortality (OR 0.48, CI 0.47 to 0.48, p<0.001). Increasing stage, increasing age, increasing comorbidity scores all had an expected detrimental hazard for mortality (Table 1).

Conclusions/Discussion: Adenosquamous carcinoma of the colon and rectum presents at a more advanced stage compared to its adeno and squamous counterparts and overall survival is significantly lower across all stages. The presence of adenosquamous pathology should be considered a very poor prognostic factor.

Cox Regression for Survival Following Diagnosis of Colon or Rectal Malignancy	OR	95% CI	P
Age (Decade, Years)	1.38	1.37 to 1.38	<0.001
Charlson Deyo Score (Versus Score of Zero)			
CDCC 1	1.23	1.22 to 1.25	<0.001
CDCC 2	1.63	1.61 to 1.66	<0.001
CDCC 3	2.14	2.1 to 2.19	<0.001
NCDB Analytic Stage (Versus Stage 1)			
Stage 2	1.53	1.51 to 1.56	<0.001
Stage 3	2.65	2.62 to 2.69	<0.001
Stage 4	9.88	9.73 to 10.0	<0.001
Oncologic Resection	0.48	0.47 to 0.48	<0.001
Chemotherapy	0.55	0.55 to 0.56	<0.001
Radiation	1.08	1.07 to 1.09	<0.001
Squamous Pathology (Versus Adeno)	0.96	0.90 to 1.02	0.172
Adenosquamous Pathology (Versus Adeno)	1.88	1.66 to 2.12	<0.001

Table 1: Cox regression modeling for hazard of mortality following diagnosis and treatment of varying malignancy of the colon and rectum. Most notable is the detrimental impact of an adenosquamous pathology compared to adenocarcinoma and the relative parity in survival between adeno and squamous pathologies.

DOES SIZE MATTER? ANALYSIS OF THE IMPACT OF STAPLER SIZE ON THE RISK OF ANASTOMOTIC COMPLICATIONS IN COLORECTAL SURGERY.

P177

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Purpose/Background: Anastomotic leak or stricture of colorectal anastomosis are a feared complication that can affect functional outcomes, quality of life, cancer recurrence and mortality. The cause of anastomotic complication is multifactorial, with the size of the end-to-end anastomosis (EEA) stapler used for colorectal anastomosis as a modifiable factor but there is a paucity of studies that look at its influence on postoperative anastomotic complications. Our goal was to examine the impact of the colorectal anastomosis stapler size on the risk of anastomotic complications in elective colorectal resections.

Methods/Interventions: A prospectively maintained divisional database was reviewed for consecutive patients who underwent elective left-sided colorectal resections with a colorectal anastomosis using an EEA stapler transanally from 1/1/2013-5/31/2018. Patients were stratified into 28mm or 31mm cohorts. Data evaluated included patient and disease demographics, operative variables, and postoperative outcomes. The primary outcome measure was the rate of anastomotic complications. Secondary outcomes were the readmission, intervention, reoperation, and mortality rates. Univariate analysis was performed to assess significant variables associated with the outcomes measures. Multivariate logistic regression analysis was performed to identify predictors of anastomotic complications and outcomes.

Results/Outcome(s): During the study period, 445 cases were evaluated- 36% in the 28mm and 64% in the 31mm stapler cohorts. Patients were comparable in age, primary diagnosis, and surgical technique; however, there was more males anastomosed with the 31mm compared to the 28mm stapler (57.5% vs 28.1% respectively, p < 0.01).

Significantly more patients developed an anastomotic stricture in the 28mm (6.9%) than the 31mm stapler group (2.5%) ($p = 0.043$). There was no significant difference in the anastomotic leak rate across groups ($p = 0.3$). There was no significant difference in readmission or reoperation rates between the two groups. There was a trend towards increased rate of reoperation in the 31mm cohort ($p = 0.06$, Fishers exact test, OR 3.82, 95% CI [1.04 - 26.76]). On logistic regression, neither gender, operative indication, nor technique were associated with anastomotic leak, readmission, or reoperation. Stapler size remained significantly associated with stricture ($p = 0.01$).

Conclusions/Discussion: Among patients undergoing colorectal anastomosis, the use of the 28mm EEA stapler was associated with an increased rate of anastomotic stricture, when compared to the 31mm EEA stapler. With these results, further controlled studies are warranted. The size of the stapler is an ideal target for improving anastomotic complication rates, as this simple process measure is operator dependent and readily adaptable to new evidence to improve patient outcomes.

Logistic regression analysis of anastomotic leak rate				
Predictor	B	SER	P value	Odds Ratio [95% CI]
Gender	-0.23	0.43	0.59	0.68 [0.29 - 1.55]
Indication	-0.01	0.01	0.57	-
Technique (laparoscopy vs. open)	0.15	0.77	0.85	1.26 [0.35 - 8.72]
Stapler size	0.17	0.17	0.31	1.80 [0.74 - 5.11]
Logistic regression analysis of anastomotic stricture rate				
Gender	-0.85	0.53	0.11	0.70 [0.23 - 1.84]
Indication	0.00	0.01	0.67	-
Technique (laparoscopy vs. open)	-0.63	0.68	0.36	0.54 [0.17 - 2.51]
Stapler size	-0.44	0.17	0.01*	0.34 [0.12 - 0.90]*

WHAT IS THE OPTIMAL LENGTH OF OPIOID PRESCRIPTION AFTER HEMORRHOIDECTOMY?

P178

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Purpose/Background: Over the past two decades, there has been increased use of opioid medications along with increased deaths due to opioid overdoses. To combat this, some state level regulations have been passed to limit the duration of new outpatient opioid prescriptions to 7 days. Hemorrhoids are a common benign condition that affects approximately 1 million adults per year. Surgical management of symptomatic hemorrhoids is highly successful, but is associated with significant postoperative pain. There are currently no evidence based guidelines for opioid prescribing following hemorrhoidectomy. Our goal is to investigate the patterns in duration of opioid prescriptions after hemorrhoidectomy and determine if there is

a relationship between length of post-hemorrhoidectomy opioid prescription and need for opioid refill.

Methods/Interventions: The Department of Defense Military Health System Data Repository (2006-2014) was used to identify opioid naïve patients over the age of 18 who were enrolled in TRICARE insurance program and underwent surgical hemorrhoidectomy. Opioid naïve patients were defined as those who had not had an opioid prescription within 6 months of index procedure. Opioid refill was defined as receiving a second opioid prescription within 14 days from the end date of the initial post-surgical prescription. Patients who underwent rubber band ligation only were excluded. A generalized additive model with spline smoothing was used to model adjusted predicted risk of opioid refill based on number of days' supply of initial opioid prescription after hemorrhoidectomy. Covariates included in the model were gender, race, history of substance abuse, history of inflammatory bowel disease, Charlson score, postoperative complications, and rank.

Results/Outcome(s): A total of 9,859 patients met inclusion criteria, with median age of 46 years (IQR 37-56). 45.8% of these patients were female. 30.9% were active duty beneficiaries, 38.6% were dependent beneficiaries, and 28.1% were retiree beneficiaries. 8.4% of patients had a history of fibromyalgia, and <1% of patients had a history of substance abuse, ulcerative colitis, or Crohn's disease. 6,608 patients (67%) received an initial post-hemorrhoidectomy opioid prescription with a median five-day supply (IQR 3-7) and a range of one to 30 day supply. A total of 2,050 patients (31%) required a refill opioid prescription with 12 days of the intended end date of initial supply, with refill prescriptions of median five-day supply (IQR 3-7) and range of 1 to 45 day supply. The modeled risk of refill based on initial prescription supply ranged from a high of 34.7% risk with an initial prescription of one-day supply, to an early nadir at 24.9% risk of refill with an initial 11-day supply (Figure 1).

Conclusions/Discussion: We demonstrate that the optimal length of a post-surgical hemorrhoidectomy opioid prescription lies between the median five-day supply and the modeled early nadir of 11 days. A 7-day supply may be a reasonable standard length of opioid prescription for post-hemorrhoidectomy pain.

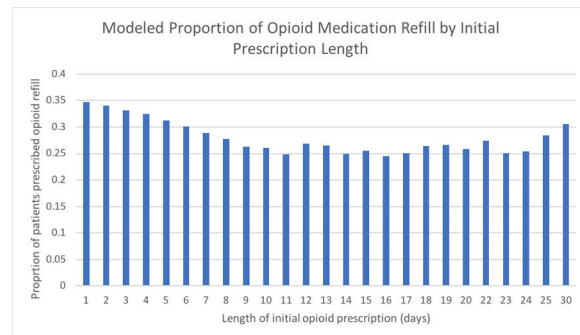


Figure 1: Modeled adjusted proportion of individuals needing opioid prescription refill by initial prescription length in days

SINGLE CENTER EXPERIENCE AND EARLY ADAPTATION OF ROBOTIC AND LAPAROSCOPIC ASSISTED TRANSANAL TOTAL MESORECTAL EXCISION (TATME).

P179

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Purpose/Background: Transanal Total Mesorectal Excision (TaTME) is an additional minimally invasive technique used in the ever-evolving surgical management of rectal cancer. This approach facilitates the pelvic dissection for technically challenging patients with challenging anatomy, as well as potentially allowing for increased success with sphincter preservation and improved oncologic outcomes. TaTME has demonstrated an improved ability to achieve a negative circumferential resection margin (CRM) and improved mesorectal excision quality.¹ At our institution, we have adopted a robotic and laparoscopic assisted transanal approach for total mesorectal excision. We present our early outcomes and experience with this technique for rectal cancer patients.

Methods/Interventions: We retrospectively reviewed a single institution prospectively maintained database of patients undergoing surgery for rectal adenocarcinoma. We identified 12 patients who underwent robotic and laparoscopic assisted TaTME by two colorectal surgeons from June 2015 to November 2018. Procedures were performed with a combined perineal and abdominal approach, followed by hand-sewn coloanal anastomosis and fecal diversion with creation of diverting loop ileostomy. In the early adaptation of this technique, both attending surgeons operated together. However, during the latter portion of the data set, the operation was done by a single surgeon. Intraoperative ICG angiography was routinely used for evaluation of perfusion to resection margin and anastomosis. In addition to baseline demographics and peri-operative factors, we reviewed final pathology and incidence of complications for this unique population.

Results/Outcome(s): A total of 12 patients successfully underwent robotic and laparoscopic assisted TaTME with no conversion to open laparotomy. The mean age was 57 years (34-71); 11 out of 12 patients (92%) were male; the mean body mass index (BMI) was 29 kg/m² (18-41). Mean distance from the anal verge was 5.63 cm (3-8). Mean operative time was 365 minutes (261-501). Mean estimated blood loss was 152 mL (40-400). Mean length of stay was 5.15 days (2.28-11.14). The mean number of lymph nodes retrieved was 16.75 (12-26). We achieved a negative circumferential resection margin (CRM) in all specimens with an average distance of 14.5 mm (1-70). Distal resection margin (DRM) was also negative in all specimens with a mean of 20 mm (4-45). Therefore, complete resection (R0) was achieved in all patients. The quality of the total mesorectal excision was graded as complete in all pathologic specimens. Seventy five percent of patients had a specimen

extracted through the anus. Twenty five percent of patients had Pfannenstiel incision secondary to bulk of the extracted specimen. One patient developed a colorectal fistula after traumatic foley placement by an outside emergency department through the urethra. Two patients underwent dilation of anal stricture during diverting loop ileostomy reversal. Patients had an average of 184 days (72-303) of diversion with loop ileostomy. Neither mortality nor anastomotic leak was observed during our study time. Mean follow-up duration was 390 days with range of 5-925 days.

Conclusions/Discussion: This study demonstrated safety and efficacy of oncologic and postoperative outcomes after robotic and laparoscopic assisted transanal total mesorectal excision. This contributes to the ever-growing literature regarding the safety and oncologic equivalency of this technique in the treatment of rectal cancer. We anticipate continued improvements with this approach as well as its ability to facilitate improved oncologic and postoperative outcomes. However, multicenter randomized controlled trials are warranted to further evaluate the oncologic efficacy, safety, and applicability of TaTME.

References 1. Ma et al. Transanal total mesorectal excision (taTME) for rectal cancer: a systematic review and meta-analysis of oncological and perioperative outcomes compared with laparoscopic total mesorectal excision. *BMC Cancer*. 2016 Jul 4;16:380

IS THERE A RELATIONSHIP BETWEEN BODY MASS INDEX, NUTRITIONAL STATUS, AND SURVIVAL RATES IN RECTAL CANCER PATIENTS?

P180

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Purpose/Background: There is conflicting data on the effects of obesity on outcomes in patients with rectal cancer. Using body mass index (BMI) measurements to define obesity, reports have revealed an increase in local recurrence rate in obese rectal cancer patients. However, more recent literature has shown no difference in local recurrences and even better long-term outcomes among rectal cancer patients who are obese. We hypothesize that higher BMI is associated with increased survival in rectal cancer patients due to better nutritional status as indicated by higher albumin levels at time of diagnosis. The objective of this study is to analyze the relationship between BMI, nutritional status, and survival among patients with rectal cancer.

Methods/Interventions: A retrospective review was performed on all patients with rectal adenocarcinoma diagnosed between 2008 and 2012 at a single institution. Patient demographics, albumin levels at time of diagnosis, tumor type, stage, type of surgery, local recurrence rates, and 5-year survival rates were analyzed. The patients were divided into BMI groups as follows: BMI < 25mg/kg²

(optimal weight), BMI 25-30mg/kg² (overweight), and BMI > 30mg/kg² (obese). Good nutritional status was defined as albumin \geq 3.5 g/dL at the time of diagnosis. Bivariate and multivariate logistic regression analyses were done with survival as the primary outcome. Secondary outcomes included sphincter preservation and local recurrence.

Results/Outcome(s): There were 177 patients diagnosed with rectal cancer with a median age of 56 years. The majority (83.5%) was diagnosed with stage II or higher cancers. There were 91 (51.4%) patients with BMI < 25mg/kg², 47 (26.6%) patients with BMI 25-30mg/kg², and 39 (22%) patients with BMI > 30mg/kg². Poor nutritional status with albumin < 3.5 g/dL was noted in 48.6% of the patients (N = 86). Within that subset, a significant number of patients (N = 49) had a BMI < 25mg/kg². The 5-year overall survival rate was 42.3% with a median of 36 months. In the bivariate analysis, higher BMI was associated with better survival at 5 years (p-value = 0.04). In the multivariate analysis of survival at 5 years, higher BMI (OR 2.1 95%CI 1.2-3.5) was also associated with improved survival (OR 0.94, 95%CI 0.90-0.99). There was no difference in nutritional status among the three BMI cohorts and good nutritional status was not significantly associated with survival. Furthermore, BMI was not predictive of sphincter preservation (OR1.7, 95%CI 0.9-3.4) or local recurrence (OR0.9, 95%CI 0.5- 1.5).

Conclusions/Discussion: Obesity, as determined by BMI, is not associated with decrease sphincter preservation or increase local recurrence rates. Notably, patients with a higher BMI at the time of rectal cancer diagnosis have improved survival rate at 5 years. Perhaps a higher BMI is protective from the complex metabolic disorder and poor survival associated with cancer cachexia. Good nutritional status as determined by albumin levels at diagnosis is not significantly associated with higher BMI or improved survival rates. It is unclear if other markers of nutritional status and/or additional anthropometric measurements analyses would conclude that there is a relationship between these factors. Therefore, further studies are needed to clarify the relationship between these three parameters in rectal cancer patients.

THE IMPACT OF SOCIOECONOMIC STATUS ON THE SURGICAL TREATMENT OF RECTAL CANCER AT COMMUNITY VERSUS ACADEMIC CENTERS: A NATIONAL CANCER DATABASE STUDY.

P181

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Purpose/Background: Socioeconomic status has been shown to affect the receipt of treatment and overall survival for rectal cancer. Disparities in surgical care have also been seen where laparoscopy and even aggressive surgical procedures, such as abdominoperineal resections, are more likely to be performed at academic programs (AP); and

robotic surgical resections more commonly performed on those with higher incomes and private insurance at AP. While minorities and Medicaid patients are more likely to undergo surgical resection at academic facilities, other socioeconomic factors affecting receipt of surgical resection at academic programs (AP) vs. community programs (CP) has not been clearly elucidated. The purpose of this study is to identify the socioeconomic status and patient demographics with rectal cancer and determine the impact such factors have on patients seeking surgical treatment for at community versus academic programs.

Methods/Interventions: The National Cancer Database (NCDB) was retrospectively reviewed to identify patient demographics and socioeconomic factors impacting patients undergoing major colorectal surgery for rectal cancer at community or academic centers between the years of 2004-2014. Socioeconomic factors evaluated were income, insurance and percentage of patients with high school diploma (HSD). Other demographics evaluated included patient age, tumor location, pathological stage, other treatments received, Charlson Deyo score, race, sex, distance from the treating facility and population of place of residence. Socioeconomic factors included race, ethnicity, income, insurance status, and education. A multivariate analysis using logistic regression model was completed to compare these variables. Additionally, a univariate analysis with propensity matching was performed to look at outcomes of resection margins, unplanned readmission, 30-day mortality, 90-day mortality, overall survival at CP versus AP.

Results/Outcome(s): In review of NCDB we queried a total of 111, 014 patients diagnosed with rectal cancer from 2004-2014. Of these, 61, 592 received their surgical care at community center and 49, 422 received their surgical care at an academic center. The primary outcomes were analyzed using a multivariate analysis with linear regression model. We found that patients of advanced age (greater than 64 years of age), white, private insurance/Medicare/other government insurance not including Medicaid, income greater than \$63,000 per year, regions where >21% or 7-12.9% of population did not have high school diploma (HSD), both rural and urban patients overall were more likely to seek surgical treatment at a CP and this was statistically significant (p value <0.0001). Younger patients, black and other races, Medicaid insurance, income less than \$38,000 per year, regions <7% population have HSD were less likely to seek surgical treatment at a CP (p value <0.0001). Co-morbidities and ethnicity were not found to have statistically significant effect on treatment center. Additionally, patients with rectosigmoid junction malignancy versus rectal malignancy, stage II or III disease were more likely to have surgery at CP (p value <0.0001). Patients who underwent neo-adjuvant chemotherapy or radiation were less likely to undergo surgical treatment at a CP (p value <0.0001). A univariate analysis with propensity matching was used to evaluate secondary outcomes including resection margins, unplanned readmission, 30-day

mortality, 90-day mortality, overall survival at community versus academic centers. AP were found to have higher percentage (93.6%, 34,271) of negative surgical margins compared to CP (93.1%, 34,076 patients) with a p value 0.01. Unplanned readmissions were higher at AP with 6.4% compared to CP at 6% and this was statistically significant with p value 0.001. The 30-day mortality rate was 1.6% at CP versus 1.3% at AP (p value 0.004). The 90-day mortality rate was 2.9% at CP versus 2.5% at AP (p value 0.002). Overall survival higher at AP comparatively.

Conclusions/Discussion: Patients with advanced age, stage II/III rectosigmoid cancers, white, private insurance/Medicare/other government insurance except Medicaid, higher incomes and those living in less educated regions were more likely to undergo surgical resection of their rectal cancers at a CP. However, since AP have a higher rate of negative surgical margins, improved 30-day and 90-day mortality rates, and improved overall survival, we should strive towards increasing access to either AP or high volume CP with best outcomes.

INITIAL COLORECTAL SURGERY CHOICE, REPEAT INTERVENTIONS, AND CAUSES OF MORTALITY IN A FAMILIAL ADENOMATOUS POLYPOSIS PATIENT REGISTRY.

P182

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Purpose/Background: Familial adenomatous polyposis (FAP) patients are at significantly increased risk of developing multiple cancer types; most notably colorectal cancer which has historically been the highest cause of mortality for these patients. However, duodenal, thyroid, and gastric cancers are also more prevalent in FAP patients as compared to the general population. Existing recommendations for patients with FAP or attenuated FAP (AFAP) include a rigorous surveillance schedule entailing frequent upper and lower endoscopies. Due to near universal development of colorectal cancer by age 40, prophylactic colorectal surgical intervention is warranted to mitigate this risk. Multiple colorectal surgical options exist, each with different profiles of future dysplasia risk as well as lifestyle considerations that must be weighed by the surgeon and patient during the decision-making process. Total proctocolectomy with ileal pouch-anal anastomosis (IPAA) and colectomy with ileorectal anastomosis (IRA) are the two most commonly employed surgeries in this population. However, segmental colectomy, as well as proctocolectomy or colectomy with end ileostomy may also be utilized. This study specifically describes initial colorectal surgery interventions, the need for repeat surgeries, cancer diagnosis, and causes of mortality observed in an FAP patient registry.

Methods/Interventions: Patients with FAP or AFAP were identified through the Hereditary Gastrointestinal

Cancer Registry (HGCR). HGCR and the Huntsman Colon Cancer Registry contains individuals with both familial and hereditary colorectal cancers and is an active study with 20 years of longitudinal enrollment and data. Patients with FAP or AFAP were then linked to the University of Utah's electronic medical records (UUEMR) in order to yield adequate data regarding patients' medical, surgical, and cancer history. Patients without sufficient information from the HGCR or UUEMR were excluded. Data including demographics, surgical history, cancer diagnoses, and causes of death where applicable were reviewed and reconciled from both data sources. The resulting data was subsequently compiled and analyzed using logrank tests and Fisher's Exact tests to determine relationships between surgery types and associated variables.

Results/Outcome(s): A total of 178 patients with either FAP or AFAP were identified and linked between HGCR and UUEMR. Of these, 38 records contained limited information and were excluded, leaving 140 patients. There were 41 patients (29.3%) with AFAP, mean age was 48.7 years, and 80 (60.0%) of the patients were female. The patients had been followed for a mean time of 11.3 years, and 15 (10.7%) of the patients had died while enrolled. The most common initial colorectal surgery was IPAA with 60 patients (42.9%), closely followed by IRA with 50 patients (35.7%). Less common surgeries included total colectomy with ileostomy 11 (7.9%), segmental colectomy 5 (3.6%) or no colorectal surgery 13 (9.3%). Fisher's Exact test found that patients who underwent IPAA were more likely to be female ($p = 0.01$), and less likely to have AFAP ($p < 0.01$) compared to IRA patients. Among patients who underwent a colorectal surgery, 19 (15.0%) required at least one additional colorectal surgery, on average 10.3 years following the initial colorectal surgery. Colorectal cancer was diagnosed in 22 (15.7%) of patients, gastric cancer was diagnosed in 7 (5.0%) of patients, and 9 (6.4%) of patients underwent either duodenal surgery or a Whipple for duodenal polyps. Of the 15 deceased patients, 6 died due to gastric adenocarcinoma, 3 from non-FAP associated malignancies, 2 from desmoid tumors, and 1 secondary to colorectal cancer.

Conclusions/Discussion: This study retrospectively analyses FAP and AFAP patients enrolled in a high-risk cancer registry to determine the prevalence and types of surgical interventions, repeat interventions, diagnoses of cancers, and causes of mortality. The majority of patients initially underwent either IPAA or IRA, with IRA patients significantly more likely to be male and have AFAP compared to IPAA patients. This study suggests that while AFAP and FAP patients are undergoing appropriate colorectal interventions to reduce the risk of death from colorectal cancer; repeat colorectal surgery is not infrequent with 15% of patients requiring at least one additional colorectal surgery after an average of 10.3 years. Additionally, the development of gastric and duodenal dysplasia is common, with over 10% of patients diagnosed

with one or both of these diseases. Furthermore, the leading cause of death was gastric adenocarcinoma; these findings necessitate more research concerning possible modification of upper GI screening recommendations to incorporate the risk of gastric dysplasia development which may help to reduce the incidence of gastric adenocarcinoma and the associated risk of mortality.

NOVEL APPROACH: COMBINED ENDOSCOPIC ROBOTIC SURGERY FOR COMPLEX POLYP RESECTION.

P183

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Purpose/Background: Advancements in colorectal cancer screening have improved colonic polyp detection before the transition to carcinoma. As a result, an increasing number of complex polyps are removed through traditional colectomy. To minimize morbidity and mortality associated with this procedure, combined laparoscopic endoscopic surgery (CELS) has gained popularity for complex polyp resection. This procedure can be challenging given that CELS often requires 3-dimensional mobilization and intracorporeal knot tying. We aim to address these drawbacks by describing a case series of a novel technique, one modifying traditional CELS through robotic approach termed combined endoscopic robotic surgery (CERS).

Methods/Interventions: In each successful case of this series, the complex polyp was found in the colon endoscopically. The da Vinci Xi robot was docked after trocars were placed. The colon was mobilized and invaginated to aid endoscopic lift and resection of the polyp. The resection site was then over-sewn with absorbable Lembert sutures.

Results/Outcome(s): CERS was attempted in six cases, three of which saw the CERS technique through to completion. In these three cases, OR time ranged from 82 – 106 minutes. Final pathology showed a sessile serrated adenoma, tubular adenoma, and villous adenoma in the right colon for each of these successful cases, all negative for malignancy. For the three cases that did not result as planned, concern for malignancy, ileocecal valve involvement, and a smaller

than stated adenoma resulted in a robotic right hemicolectomy, ileocelectomy, and colonoscopy, respectively.

Conclusions/Discussion: This serves as the first known description of CERS, a practical technique to improve upon CELS for resection of complex colonic polyps. Given the median duration for conventional CELS has been reported to be 152 minutes with a range of 96-322 minutes, we note a decreased operating time using CERS. Furthermore, we felt more confident with our intracorporeal suturing and 3-dimensional visualization. Capital investments aside, the use of the robot was not cost prohibitive. Additional studies are needed to further define the role of robotics in combined endoscopic surgery.

CONVENTIONAL LAPAROSCOPY VERSUS TRANSANAL TOTAL MESORECTAL EXCISION(TATME) FOR RECTAL CANCER AFTER NEOADJUVANT CHEMORADIATION: LONG-TERM FOLLOW-UP RESULTS.

P184

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Purpose/Background: Since its earliest reports, Transanal Total Mesorectal Excision (taTME) has attract-ed attention regarding its potential role in rectal surgery. Many series reports proved both surgical and pathological advantages of taTME, particularly in male patients, patients with narrow pelvic anatomy, and patients with low-lying tumors. Given that noninferiorty, or perhaps even superiority, will determine whether TaTME becomes accepted as a standard of treatment, further investigation into long-term survival benefits is of utmost importance.

Methods/Interventions: Our group published a matched and case-controlled study for post-radiation rectal cancer in 2016, demonstrating that taTME is not only safe and feasible, but also rapidly evolving and poses great potential for further development. Compared with LapTME, taTME not only achieved identical circumferential margin status without compromising other operative and quality parameters, but also benefited patients by achieving longer distal margins. This current study presents three-year follow-up

P182 Initial Surgery Type, Demographics & Repeat Surgery

	Ileal Pouch-Anal Anastomosis	Colectomy with Ileorectal Anastomosis	Colectomy with Ileostomy	Segmental Colectomy	No Colorectal Surgery	Other
Number of Patients	60 (42.9%)	50 (35.7%)	11 (7.9%)	5 (3.6%)	13 (9.3%)	1 (0.7%)
Female	41 (68.3%)	22 (44.0%)	5 (45.5%)	4 (80.0)	7 (53.8%)	1 (100%)
Mean Age at Surgery	24.9	31.8	26.9	27.6		36
Attenuated FAP	5 (8.3%)	21 (42.0%)	0 (0%)	2 (40.0%)	13 (100%)	0 (0%)
Additional Colorectal Surgery	7 (11.7%)	8 (16.0%)	2 (18.2%)	1 (20.0%)		1 (100%)

data to our 2016 study, paying attention to survival rates and related analyses.

Results/Outcome(s): In a 2:1 LapTME:taTME ratio, our study matched patients based on age, gender, ASA score, and malignancy clinical stage. Of the 100 patients in the LapTME group, 76 were male and the average follow-up time was 84.5 ± 41.6 (9.5-127) months. Of the 50 patients in the taTME group, 38 were male and the average follow-up time was 44.3 ± 10.5 (6.6-55.7) months. In terms of three-year overall survival (LapTME 99%; taTME 98%), disease-free survival (LapTME 82%; taTME 82%), and local recurrence-free survival (LapTME 91.5%; taTME 92.5%), the taTME group did not reach statistical significance when compared to the LapTME group. When all 150 patients were analyzed as one group, independent factors that were statistically significant to disease-free survival included lymph node status, tumor differentiation, and CRM positivity ($<1\text{mm}$). Lastly, while taTME trended towards achieving lower CRM positivity when compared to LapTME (4% vs. 10%), the small sample size of the study was insufficient to power statistical significance.

Conclusions/Discussion: According to our three-year survival data analysis, the advantage of achieving a longer distal margin distance via taTME did not translate into survival or local recurrence-free benefits. However, CRM positivity ($<1\text{mm}$) emerged as a strong independent factor in predicting disease recurrence, both local and distant, and taTME remained promising in this aspect. Further prospective randomized clinical trials are thus needed to clarify and establish more solid evidence pertaining to this rapidly evolving surgical technique.

ACCURATELY PREDICTING PATHOLOGICAL COMPLETE RESPONSE AFTER NEOADJUVANT CHEMORADIO THERAPY FOR RECTAL CANCER USING XGBOOST MACHINE LEARNING MODEL: RESULTS OF A RETROSPECTIVE STUDY ON 870 PATIENTS.

P185

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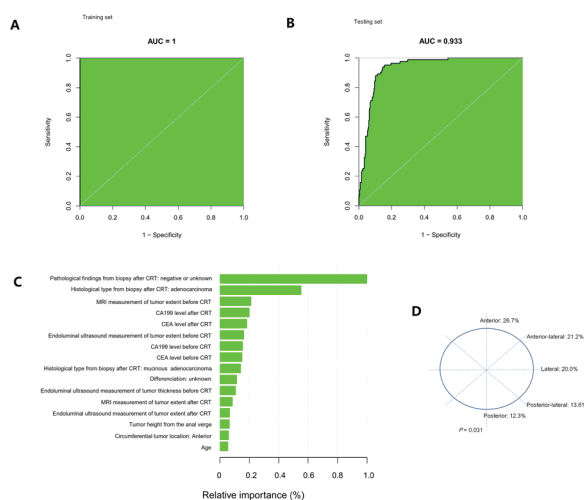
Purpose/Background: Predicting pathological complete response (pCR) after neoadjuvant chemoradiotherapy (CRT) for locally advanced rectal cancer could represent a major step towards organ preservation strategies. Our goal was to apply a statistical approach to identify pCR patients using pre-surgical features.

Methods/Interventions: A total of 870 locally advanced rectal cancer (cT3-4 and/or N+) patients underwent long-course CRT and curative resection between 2010 and 2017 were included. For each cases, 24 pre-surgical features, including 2 demographic characteristics, 6 MRI features, 6 endoluminal ultrasound features, 4 serum markers, 2 pathological features from biopsy, and

4 digital rectal examination features were extracted. The Extreme Gradient Boosting (XGBoost) algorithm, a statistical nonlinear machine learning classification, was used to identify predictors and classify pCR cases. To overcome overfitting, the study cohort was randomly splitted into two sets and external validation was performed. Classification performance was scored by the area under the receiver operating characteristic curve (AUC).

Results/Outcome(s): The overall pCR rate was 18.3% (159/870). An XGBoost machine learning model was created based on training set of 425 cases to predict pCR after CRT. Our model for predicting pCR had a high accuracy of 99.8% (95% CI 0.987–0.999) and an AUC of 1.000 (Figure 1A). The accuracy was 87.2% (95% CI 0.837–0.902) and the AUC was 0.933 when the model was applied to the testing set containing 445 cases (Figure 1B). The XGBoost model variable importance plot was then generated to exhibit the predicting abilities of predictors (Figure 1C). Remarkably, pathological negative or unknown from endoscopic biopsy after CRT was of highest importance in predicting pCR (Importance score, IS: 0.268). Besides, tumor extent measured by MRI or endoluminal ultrasound before CRT (IS: 0.057 for MRI and 0.044 for endoluminal ultrasound), rather than post CRT (IS: 0.023 for MRI and 0.018 for endoluminal ultrasound), exhibited a more important predictor. In addition, serum CA199 and CEA levels pre and post-CRT were all of value for model construction. Interestingly, for circumferential tumor location, the anterior tumor exhibited the highest pCR rate of 26.7% (IS: 0.016), which gradually dropped to 21.2%, 20.0%, 13.6% and 12.3% for anterior-lateral, lateral, posterior-lateral and posterior tumor, respectively ($P = 0.031$, Figure 1D).

Conclusions/Discussion: In this study, our machine learning model based on XGBoost analysis is sufficiently accurate for safe selection of pCR patients appropriate for a rectum-sparing strategy. Pathological negative or unknown from endoscopic biopsy after CRT is the single most accurate modality for identification of pCR after CRT. In addition, anterior tumors are associated with higher chances of pCR.



EDUCATION AND ENGAGEMENT: KEY FACTORS ENABLING COLORECTAL CANCER PATIENTS TO PROMOTE BENEFITS OF SCREENING AMONGST THEIR SIBLINGS, A RANDOMISED CONTROLLED TRIAL.

P186

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Purpose/Background: First degree relatives of colorectal cancer patients are recommended colonoscopy according to local screening guidelines. However, prior studies revealed that patients seldom discuss such health promotion messages to their siblings. The study aims to determine a novel counselling package would enable patients to better engage their siblings.

Methods/Interventions: Colorectal cancer patients at a single tertiary centre were recruited and assigned to receive a new counselling package (intervention) or the current standard advice (control). Randomisation was computer generated with permuted blocks with participants blinded. Analysis was by intention to treat. The primary outcomes were patient contact and sibling response rates.

Results/Outcome(s): Between 1 May 2017 to 30 Apr 2018, a total of 83 participants were assigned to receive the new (n=40) or standard (n=43) counselling package. Three participants dropped out from the control. The sample demographics were comparable in terms of median age, gender, racial distribution and type of residences. Despite the intervention, both arms had similar sibling contact rates (>90%) with the preferred mode of engagement being to inform their siblings in person. Given the frequent engagement and education of the patients in the intervention group, the higher level of assumed screening awareness has increased in the likelihood (p-value: 0.039) of patients convincing their siblings to contact the study team. These siblings adopted a proactive approach towards contacting the study team (p-value: 0.009) and registered their interest to understand more about colorectal cancer screening. However, the uptake of screening colonoscopy remained dismal in both arms. Barriers towards colonoscopy was the most common reason to decline uptake.

Conclusions/Discussion: The novel counselling package increases the awareness and importance of colorectal cancer screening amongst patients hence inspiring them to become screening advocates for their siblings. However, further interventions would be required to overcome the barriers towards uptake of colonoscopy.

NOMOGRAMS THAT PREDICT THE RESPONSE TO PREOPERATIVE CHEMORADIOTHERAPY IN PATIENTS WITH LOWER RECTAL CANCER.

P187

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Purpose/Background: In recent years, observation without surgery has been focused on as a novel treatment strategy for patients with rectal cancer who have undergone chemoradiotherapy (CRT). Although the criteria for selecting candidates for this treatment is an important issue, they have not been established. We aimed to develop a nomogram to predict tumor regression after CRT using endoscopic findings, pathological findings, and fluorodeoxyglucose (FDG)-positron emission tomography (PET).

Methods/Interventions: A total of 160 consecutive patients with lower rectal cancer who underwent CRT followed by the assessment of tumor regression based on colonoscopy and FDG-PET and then underwent curative resection were enrolled in the study. Changes in marginal swelling on endoscopic findings, the pathological findings of biopsy samples from tumors, and maximum standardized uptake values (SUVmax) on FDG-PET were used as variables to develop the nomogram. Grades 2 and 3 tumor regression based on the Japanese classification were defined as good response, and nomograms predicting good response and pathological complete response (pCR) were developed using variables that showed correlation (p<0.1) in logistic regression analysis.

Results/Outcome(s): Good response was achieved in 52.5% of the patients, and the pCR rate was 11.3%. Marginal swelling was classified into two groups; flattened and non-flattened. Biopsies from tumor were also classified into three groups: adenocarcinoma, atypical cells, and no remaining cancer. Marginal swelling, biopsies, and SUVmax all showed significant correlations with both good response and pCR in univariate analysis. We developed a nomogram predicting good response using 4 factors (clinical T factor, p=0.094; biopsy, p<0.001; marginal swelling, p=0.010; and SUVmax, p=0.008), which showed correlations in multivariate analysis, and another one predicting pCR using 3 factors (clinical T factor, p=0.089; biopsy, p=0.027; and marginal swelling, p=0.039). C-indices for good response and pCR were 0.820 and 0.789, respectively, showing good prediction.

Conclusions/Discussion: We developed nomograms to predict the response to CRT before surgery. These nomograms should be helpful in the determination of treatment options for patients with rectal cancer, especially in selecting candidates for organ-preservation strategies.

A DEVELOPMENT OF A NOVEL LED MARKING CLIP TO DETECT THE TUMOR LOCATION IN LAPAROSCOPIC SURGERY.

P188

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Purpose/Background: Although laparoscopic surgery has been effectively applied to colorectal surgery, some problems still remain. Especially in case of early cancer, it is difficult to identify the location of tumor lesions since we cannot touch the organ directly during the surgery. The conventional preoperative marking method is tattooing of the submucosal membrane layer using India ink. However, this method has a risk of serious complications such as inflammation and perforation, and it is sometimes unreliable because of a small amount of ink or ink spreading. Therefore, we developed a novel marking device to detect the tumor location, accurately.

Methods/Interventions: We developed a novel LED marker which could be detected through the intestinal wall. It is attached to the tip of a coiled antenna and linked to an endoscopic clip with a wire. To detect the LED marker, we also developed a power source device which generates electric waves when it is brought closer to the marker outside of the human body. Before the surgery, colonoscopy was performed to place the endoscopic clip with the LED marker on the mucosal epithelium of the objective location. The surgery was performed to detect the LED marker by using the detection device. We evaluated the method with the resected human gastrointestinal specimens, and then we examined it in human colorectal laparoscopic surgeries.

Results/Outcome(s): We could accurately detect the endoscopic clip with the LED marker by using the detection device in laparoscopic surgery. We also confirmed that the clip was placed near the objective location in the resected specimen.

Conclusions/Discussion: We developed a novel marking device using a LED marker to identify a tumor location, accurately, easily and safely. We successfully demonstrated the usefulness of the device to detect the objective location in laparoscopic surgery. We hope this device will be useful for navigated surgery in the future.

USE OF DA VINCI XI SYSTEM FOR TOTALLY ROBOTIC TOTAL/SUBTOTAL COLECTOMY: A COMPARATIVE ANALYSIS WITH CONVENTIONAL LAPAROSCOPY.

P189

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Purpose/Background: While the use of robotic systems for segmental colectomies is increasing worldwide, data on robotic extended colonic resections such as total or subtotal colectomies has remained scarce. The rotating boom-mounted system feature of the da Vinci Xi™ robot facilitates working in all four quadrants of the abdomen without the need to reposition the robot. In this study, we aimed to examine the feasibility of totally robotic total/subtotal colectomy procedures with the Xi robot and to compare its short-term outcomes with those of conventional laparoscopic approach.

Methods/Interventions: Included in this retrospective study were patients with the diagnosis of a colonic neoplasm, inflammatory bowel disease, familial adenomatous polyposis or colonic inertia who underwent elective robotic or laparoscopic total/subtotal abdominal colectomy at two specialized centers between October 2010 and September 2018. Total colectomy was defined as resection of the whole colon and subtotal colectomy as resection of the whole colon without the sigmoid colon. Data on demographics, preoperative clinical characteristics, intraoperative and postoperative 30-day outcomes and histopathologic results were compared between the robotic and laparoscopic groups.

Results/Outcome(s): A total of 82 patients (54 men and 28 women) were included. There were 26 patients in the robotic group and 56 patients in the laparoscopic group. The two groups were comparable in terms of preoperative clinical characteristics (Table 1). The robotic procedures were completed with single-docking of the robot via the rotating boom-mounted system. In terms of intraoperative results, estimated blood loss (165.7±119.1 vs 197.0±120.9 ml), conversion (0% vs 14.3%), and complications (0% vs 7.1%) were similar but the mean operative time was significantly longer in the robotic group (386.4±102.4 vs 249.2±80.7 min, $p<0.001$). No difference was detected regarding the length of hospital stay (7.9±5.7 vs 9.5±6.0 days, $p=0.07$). In terms of postoperative complications, the rate of anastomotic leak (6.3% vs 8.3%), ileus (15.4% vs 19.6%), overall complications, reoperation (7.7% vs 12.5%) and readmission (19.2% vs 12.5%) were similar between the two groups. There was no mortality in either group. Histopathologically, the mean number of harvested lymph nodes in the subgroup of cancer patients was significantly higher in the robotic group (69.9±22.8 vs 53.4±17.3, $p=0.01$).

Conclusions/Discussion: In total/subtotal colectomy procedures, the da Vinci Xi platform with its rotating

boom-mounted system is feasible, safe and obviates the need for multiple dockings. The robotic approach has operative results and short-term outcomes similar to laparoscopy, but longer operative times. In patients with cancer, robotic approach is associated with higher lymph node retrieval.

SHORT TERM MORBIDITY AFTER RECURRENT RECTAL CANCER SURGERY.

P190

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Purpose/Background: Surgical management of locally recurrent rectal cancer (RRC) represents a challenge due to previous surgery and radiotherapy leading to disrupted anatomic planes. Radical resection is mandatory in order

to offer a chance for cure. This study aimed to assess short term morbidity of patients operated on for RRC in a tertiary referral center.

Methods/Interventions: This is a retrospective cohort study of consecutive patients undergoing primary RRC resection with curative intent for a local recurrence between 2000 and 2015. Demographic and surgical details were retrieved from a prospectively maintained institutional database. 30-day mortality and specific surgical and medical postoperative complications were assessed in-hospital and until 30 days postoperatively. Further outcomes of interest were need for intensive care unit (ICU) admission, length of hospital stay, reoperation and readmission rate.

Results/Outcome(s): In total, 399 patients, 57.6% male, with a median age of 59.8 years (interquartile range IQR 50.7-68.8) at 1st recurrence provided the study cohort. Median time to 1st recurrence was 2.1 years

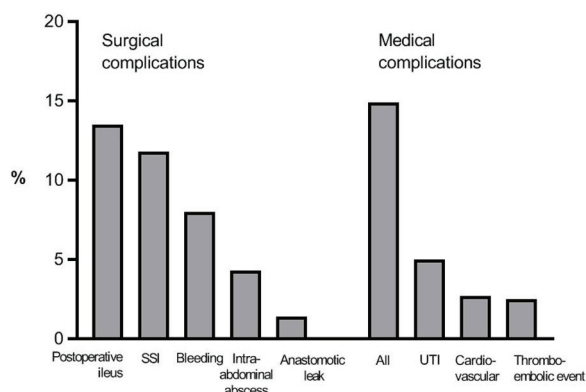
P189 Table 1. Comparison of perioperative outcomes in patients undergoing robotic versus laparoscopic total/subtotal colectomy

	Robot Group (n=26)	Laparoscopy Group (n=56)	p value
Age, years, mean±SD	51.3±15.4	56.2±18.1	0.24
Gender, male/female, n (%)	18/8 (69.2/30.8)	36/20 (64.3/35.7)	0.67
BMI, kg/m ² , mean±SD	24.6±4.5	25.1±4.7	0.72
ASA class, n (%)			0.97
1	8 (30.8)	16 (28.6)	
2	13 (50.0)	29 (51.8)	
3	5 (19.2)	11 (19.6)	
Diagnosis, n (%)			0.15
neoplasm	12 (46.2)	36 (64.3)	
benign	14 (53.8)	20 (35.7)	
Operative procedure, n (%)			0.84
total colectomy	15 (57.7)	31 (55.4)	
subtotal colectomy	11 (42.3)	25 (44.6)	
Anastomotic technique, n (%)			0.11
stapled	16 (100)	41 (85.4)	
handsewn	0 (0.0)	7 (14.6)	
Diverting stoma, n (%)	2 (12.5)	4 (8.3)	0.63
Operative time, min, mean±SD	386.4±102.4	249.2±80.7	<0.001
Operative blood loss, ml, mean±SD	165.7±119.1	197.0±120.9	0.44
Conversion, n (%)	0 (0.0)	8 (14.3)	0.051
Intraoperative complication, n (%)	0 (0.0)	4 (7.1)	0.30
Number of harvested LN, mean±SD	69.9±22.8	53.4±17.3	0.01
Bowel movement, days, mean±SD	3.0±1.5	3.2±1.4	0.55
Hospital stay, days, mean±SD	7.9±5.7	9.5±6.0	0.07
Anastomotic leak, n (%)	1 (6.3)	4 (8.3)	>0.99
Ileus, n (%)	4 (15.4)	11 (19.6)	0.77
Postoperative bleeding, n (%)	1 (3.9)	3 (5.4)	>0.99
Reoperation, n (%)	2 (7.7)	7 (12.5)	0.71
Readmission, n (%)	5 (19.2)	7 (12.5)	0.51

SD, standard deviation; BMI, body mass index; ASA, American Society of Anesthesiologists; LN, lymph node

(IQR 1.1-4.1). The most commonly performed bowel procedure was abdominoperineal resection (51.7%), with surgery resulting in an end colostomy in 64.3% of all patients. In most patients (293, 73.6%), extended or multi-visceral resection (pelvic side wall: 36.6%, intestinal: 28.6%, genitourinary: 26.5%, sacrum/coccyx: 8.3%, liver: 4%) was performed, with a median operating time of 480 minutes (IQR 360-600). Concomitant intraoperative radiotherapy (IORT) was administered in 280 patients (70.2%). RO status was achieved in 296 patients (74.2%), R1 in 84 patients (21.1%) and R2 in 19 patients (4.7%). Complications were recorded in 148 patients (37.2%). 3 patients (0.8%) died within 30 days of surgery. Specific complications are detailed in the Figure provided (may include several complications per patient). Forty-nine patients (12.4%) needed postoperative ICU surveillance. Median length of hospital stay was 8 days (IQR 6-11). Fifteen patients (3.8%) needed an unplanned surgical re-intervention, while 34 patients (8.6%) were readmitted after hospital discharge.

Conclusions/Discussion: This large single-institution review of 30 day postoperative morbidity and mortality in a large cohort of patients undergoing surgery for RRC demonstrates that surgery can be performed safely with low mortality and acceptable morbidity.



Short term (30-day) complications following recurrent rectal cancer surgery (SSI – surgical site infection, UTI – urinary tract infection)

RATE AND CAUSE OF ANASTOMOTIC FAILURE IN PATIENTS WITH HAND-SEWN COLO-ANAL ANASTOMOSIS FOLLOWING SURGERY FOR RECTAL CANCER.

P191

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Purpose/Background: In some patients with very low rectal cancer, a hand-sewn colo-anal anastomosis is the only reconstruction option to avoid a permanent colostomy. Limited data exists on outcomes related to this type of reconstruction in patients with rectal cancer. Therefore,

we aimed to determine the rate and cause of anastomotic failure in patients undergoing hand-sewn colo-anal anastomoses for rectal cancer.

Methods/Interventions: Consecutive patients undergoing primary curative resection with hand-sewn colo-anal anastomosis for rectal adenocarcinoma between 2012 and 2016 were retrospectively reviewed. Failure was defined as the need for a permanent stoma. Early failures (EF) were those that failed within 30 days of the creation of the anastomosis. Late failures (LF) were divided into 2 groups, those who failed within 30 days of reversal of diverting ileostomy and those that failed > 30 days after reversal of temporary ileostomy.

Results/Outcome(s): Fifty-eight patients (54% male) with a mean age of 56±13 years were reviewed. Mean follow-up was 32±19 months. Forty-nine patients (84.5%) are stoma-free at last follow-up. The time to permanent ostomy in those with anastomotic failure was 27.4±16.8 months after the index operation. Early failure was seen in 2 patients due to anastomotic dehiscence. Late failures included 1 patient < 30 days after ileostomy reversal due to an anastomotic fistula, and 7 patients >30 days after ileostomy reversal due to stricture (n=2), incontinence (n=3) and anastomotic leak (n=2). Neoadjuvant radiation was used in 78% of patients that had a failed anastomosis compared to 63% in those that are stoma free (p=0.4).

Conclusions/Discussion: Anastomotic failure leading to permanent ostomy in patients undergoing hand-sewn colo-anal anastomosis occurred in 15.5%. The main causes of failure were fecal incontinence and anastomotic stricture. Radiation therapy did not appear to impact outcomes.

ADJUVANT CHEMOTHERAPY REDUCES THE RISK OF RECURRENCE IN LOWER RECTAL CANCER WITH YPN2 DISEASE AFTER PREOPERATIVE CHEMORADIATION AND TOTAL MESORECTAL EXCISION.

P192

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Purpose/Background: Preoperative chemoradiotherapy (CRT) followed by total mesorectal excision (TME) is the standard treatment for patients with locally advanced cancer of the lower rectum (Rb). Currently, there is much debate as to whether adjuvant chemotherapy (AC) should be administered in patients with Rb cancer after CRT and surgery. In this study, the clinical significance of AC in addition to CRT and surgery was examined in each pathological stage.

Methods/Interventions: We examined consecutive patients with Rb cancer who underwent preoperative CRT followed by TME in our hospital between August 2003 and March 2018. Typical CRT consisted of 50.4 Gy in 28

fractions with concurrent 5-fluorouracil plus leucovorin. Clinicopathological parameters and postoperative AC were reviewed retrospectively. Effects of AC on recurrence-free survival (RFS) were analyzed regarding ypStage or ypN classified by the American Joint Committee on Cancer (AJCC)/TNM system.

Results/Outcome(s): The cohort comprised 256 patients (169 males and 87 females, mean age: 63.3 years old). Four patients received lateral pelvic lymph node dissection for both sides, whereas 29 for one side. Twenty-nine patients were diagnosed with ypStage 0, 77 ypStage I, 83 ypStage II, and 67 ypStage III, among which 41 were ypN1 and 26 ypN2. AC was administered in 82 patients. RFS curve in patients receiving AC did not differ significantly from that in patients without AC in the analyses of ypStage 0/I, ypStage II and ypN1. On the other hand, 3-year RFS rate was 49% in patients with ypN2 disease who received AC, whereas none was estimated to survive three years without recurrence in those who were not treated by AC ($p=0.02$, Figure 1).

Conclusions/Discussion: Following preoperative CRT and TME, AC appeared to contribute to the reduction in cancer recurrence in patients with ypN2 disease.

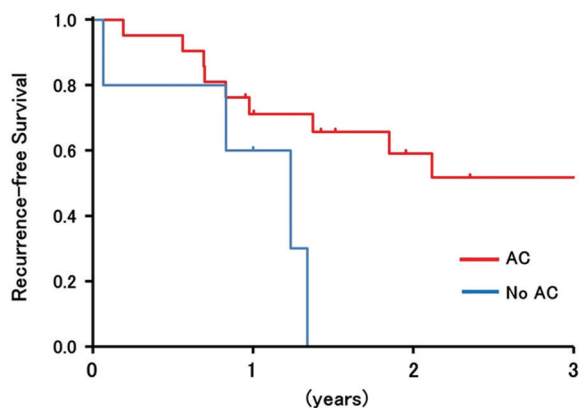


Figure 1. Recurrence-free survival curves in Rb cancer patients with ypN2 after CRT and surgery according to adjuvant chemotherapy (AC). The red line indicates the survival curve of patients receiving AC, and the blue line that of patients who did not receive AC.

THE CHANGE OF SURGICAL TREATMENT FOR ELDERLY PATIENTS WITH COLORECTAL CANCER IN JAPAN.

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Purpose/Background: The number of elderly persons is increasing year by year in Japan, and also, the number of patients who underwent surgery for colorectal cancer (CRC) is increasing. Consequently, the number of surgeries for elderly patients for CRC is also increasing. So, the aim of this study is to evaluate the change of surgical treatment in the past 15 years for elderly patients with CRC in Japan.

Methods/Interventions: The subjects were 255 patients aged ≥ 80 years old who underwent surgery for CRC at Juntendo hospital in Japan between 2003 and 2017. The patients were divided into two groups with the former group (FG) (2003~2013) (N=133), and the latter group (LG) (2014~2017) (N=122). We compared the groups by age, sex, body mass index (BMI), Glasgow prognostic score (GPS), tumor site, previous abdominal surgery, American Society of Anesthesiologists (ASA), surgical procedure, operative time, blood loss, days to solid diet, duration of hospital stay after surgery, and postoperative morbidity.

Results/Outcome(s): First, we compared the groups of the whole patients (N=255). Although there was no significant difference at sex, age, BMI, tumor site, and ASA, the ratio of malnutrition patients with bad score of GPS increased in LG than FG ($p=0.001$). In the surgical procedure, the ratio of laparoscopic colectomy (LAC) increased in LG than open colectomy (OC) ($p=0.001$), as a result, blood loss, days to solid diet, duration of hospital stay after surgery, and postoperative morbidity decreased significantly ($p=0.001$), although operative time was extended. Second, we compared the groups of limited patients who underwent LAC (N=150). The ratio of the elderly patients and malnutrition patients (bad GPS) increased in LG ($p=0.024$, $p=0.005$). Blood loss, days to solid diet, and duration of hospital stay after surgery decreased in LG significantly ($p=0.045$, $p=0.001$, $p=0.028$).

Conclusions/Discussion: Conclusions/Discussion: From 2014, we accepted five big changes; 1. Enhanced recovery after surgery (ERAS), 2. Indocyanine Green Fluorescent Imaging in Surgery, 3. Changing the gloves and surgical forceps set after intestinal anastomosis, 4. Surgical Site Infections (SSI) Surveillance, 5. Endoscopic Surgical Skill Qualification System. The introduction of those changes (1~5) might contribute to a good result. Consequently, we came to be able to perform an operation to elderly patients with CRC.

ROBOTIC COMPLETE MESOCOLIC EXCISION VERSUS CONVENTIONAL LAPAROSCOPIC COLECTOMY FOR TRANSVERSE COLON CANCER: A COMPARISON OF SHORT-TERM OUTCOMES BETWEEN TWO APPROACHES.

P194

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Purpose/Background: The CME technique in which the root of colic arteries is tied centrally and the mesocolon is radically excised in the embryological plane has been shown to produce a higher degree of lymphadenectomy, fewer local recurrences and better long-term survival compared with standard non-mesocolic excisions. In

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minimally invasive surgery, however, the CME technique for transverse colon cancer represents a uniquely challenging group because of the perceived difficulty of isolation and ligation of the middle colic vessels. Therefore, non-CME resections have become a commonly employed procedure for transverse colon cancers when carried out with the laparoscopic approach. Robotic technology has been developed to reduce the limitations of laparoscopy. In this comparative study, we aimed to present the short-term results of robotic CME versus conventional laparoscopic colectomy for transverse colon cancer.

Methods/Interventions: A retrospective review of consecutive patients undergoing robotic CME (da Vinci Xi™) or conventional laparoscopic surgery for transverse colon adenocarcinoma in two specialized centers between May 2011 and September 2018 was performed. Transverse colon cancer was defined as a tumor located between the hepatic and splenic flexures, including the flexures. Patients with a transverse colon and a synchronous colon

tumor requiring ligation of the middle colic artery at its origin were also included. Preoperative clinical characteristics, intraoperative results and postoperative 30-day outcomes were compared between the robotic CME and conventional laparoscopy group.

Results/Outcome(s): A total of 118 patients (74 men and 44 women) were included. There were 38 patients in the robotic CME group and 80 patients in the conventional laparoscopy group. The two groups were comparable in terms of preoperative clinical characteristics, TNM stages, operative procedures, type and technique of anastomosis and diverting stoma status (Table 1). The intraoperative results were similar between the groups, including estimated blood loss (105.9±103.6 vs 57.5±92.8 ml), conversion (0% vs 7.5%) and intraoperative complications (5.3% vs 3.8%) ($p>0.05$) except the rate of intracorporeal anastomosis is significantly higher (86.8% vs 20.0%, $p<0.001$) and the mean operative time was longer in the robotic group (325.0±123.2 vs 159.3±56.1 min, $p<0.001$).

P194 Table 1. Comparison of perioperative outcomes in patients undergoing robotic versus laparoscopic colectomy for transverse colon cancer

	Robotic CME Group (n= 38)	Conventional Laparoscopy Group (n= 80)	p value
Age, years, mean±SD	62.3±15.7	64.1±15.5	0.57
Gender, male/female, n (%)	27/11 (71.1/28.9)	47/33 (58.8/41.2)	0.20
BMI, kg/m ² , mean±SD	25.3±4.5	26.7±5.7	0.24
ASA class I / II / III, n (%)	10 / 19 / 9 (26.3 / 50.0 / 23.7)	19 / 36 / 25 / 18 (23.8 / 45.0 / 31.3 / 22.5)	0.70
Tumor localization, n (%)			0.24
hepatic flexure	14 (36.8)	31 (38.8)	
proximal transverse colon	2 (5.3)	11 (13.8)	
mid-transverse colon	4 (10.5)	15 (18.8)	
distal transverse colon	4 (10.5)	6 (7.5)	
splenic flexure	14 (36.8)	17 (21.3)	
Operative procedure, n (%)			0.09
extended right colectomy	19 (50.0)	47 (58.8)	
extended left colectomy	11 (28.9)	10 (12.5)	
subtotal/total colectomy	8 (21.1)	23 (28.8)	
Diverting stoma, n (%)	0 (0.0)	6 (7.9)	0.08
Operative time, min, mean±SD	325.0±123.2	159.3±56.1	<0.001
Estimated blood loss, ml, mean±SD	105.9±103.6	57.5±92.8	0.07
Conversion, n (%)	0 (0.0)	6 (7.5)	0.08
Intraoperative complication, n (%)	2 (5.3)	3 (3.8)	0.70
Bowel movement, days, mean±SD	3.5±1.5	3.0±1.9	0.17
Hospital stay, days, mean±SD	7.2±3.1	7.9±4.0	0.31
Anastomotic leak, n (%)	0 (0.0)	2 (2.6)	0.32
Postoperative bleeding, n (%)	0 (0.0)	1 (1.3)	0.49
Ileus, n (%)	3 (7.9)	10 (12.5)	0.46
Surgical site infection, n (%)			0.93
superficial	3 (7.9)	8 (10.0)	
deep	0 (0.0)	0 (0.0)	
organ/space	1 (2.6)	2 (2.5)	
Reoperation, n (%)	1 (2.6)	5 (6.3)	0.40

No differences were detected regarding hospital stay (7.2 ± 3.1 vs 7.9 ± 4.0 days) and postoperative complications, including anastomotic leak (0% vs 2.6%), bleeding (0% vs 1.3%), overall surgical site infections (10.5% vs 12.5%), and reoperation (2.6% vs 6.3%). No mortality occurred in either group. Histopathologically, all the surgical margins were clear except in one specimen with radial margin positivity in the robotic group ($p=0.15$). The mean number of harvested lymph nodes was higher in the robotic CME group (46.1 ± 22.2 vs 39.1 ± 17.8 , $p=0.047$).

Conclusions/Discussion: Both robotic CME and conventional laparoscopic approach for transverse colon cancer produced similar intra-operative and short-term postoperative outcomes except the robotic approach had longer operative times and increased lymph node harvest.

TRENDS IN UPTAKE OF MINIMALLY INVASIVE SURGERY FOR COLORECTAL CANCER RESECTION: A BI-NATIONAL PERSPECTIVE.

P195

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Purpose/Background: Minimally invasive surgery (MIS) for colorectal cancer (CRC) has short-term benefits over open resection. There have been several advancements in MIS techniques and technology since its initial introduction. Uptake of MIS internationally has increased and large trials of oncologic outcomes after MIS for CRC have been published over recent years. This study evaluates trends in MIS use over time across Australasia and investigates predictors of MIS uptake.

Methods/Interventions: Data from the Bi-National Colorectal Cancer Audit (BCCA) – a prospectively maintained registry established by the Colorectal Surgery Society of Australia and New Zealand – was utilized. All consecutive CRC resections from January 2007 to June 2018 were retrieved. Data was collected on patient demographics, socioeconomic status, level of colorectal training, institution characteristics, tumour characteristics, intra- and peri-operative details and long-term outcomes. Non-oncologic CRC surgery (e.g. diverting colostomy) was excluded.

Results/Outcome(s): Overall, 21,457 cases were analysed. There has been a steady increase in the overall quantity of MIS, whilst that of open resections has plateaued. There has been a significant increase in the proportion of MIS resections between 2007 and 2017 for all CRC (33.1% vs 69.5%; $p<.00001$) and for rectal cancer (29.5% vs 69.5%; $p<.00001$). Laparoscopy is the predominant MIS technique (87.4%). Hybrid and robotics formed 8.4% and 1.8% of all MIS cases, respectively. The majority (69.1%) of robotic resections were for rectal cancer. TaTME accounted for 1.6% of all and 3.5% of MIS rectal cancer resections – predominantly for mid and low rectal cancers. On univariate analysis, MIS was more likely to be performed electively,

in Australia (vs. New Zealand) and in patients with private insurance. Other associated factors include female sex, ASA score, procedure type, tumour characteristics and curative intent. MIS also resulted in fewer returns to theatre and fewer inpatient deaths. Elective surgery, Australian location, consultant surgeon operating remained associated with MIS use on multivariate analysis; as did ASA score and tumour characteristics. When colon and rectal cancer were analysed separately, female sex was an independent predictor of MIS use for rectal cancer resection.

Conclusions/Discussion: MIS use across Australasia has increased significantly over the past decade. Laparoscopy remains the predominant modality. MIS uptake is associated with Australian location, elective surgery, consultant surgeon operating and tumour characteristics.

THE IMPACT OF ARTERIOSCLEROSIS ON POSTOPERATIVE COMPLICATIONS IN LAPAROSCOPIC SURGERY FOR COLORECTAL CANCER.

P196

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Purpose/Background: *Background* In laparoscopic surgery (LS) for colorectal cancer (CRC), anastomotic leakage (AL) is one of the most severe and critical complications. However, a definitive preoperative predictor of anastomotic leakage remains elusive despite several previous attempts to identify one. CRC patients with associated arteriosclerotic disease have been increasing as a result of the aging society and westernized diets in Japan. The aim of this study was to evaluate whether preoperative evaluation of arteriosclerosis is associated with AL.

Methods/Interventions: *Methods* The subjects comprised 167 CRC patients who underwent LS for CRC with double-stapling technique (DST) reconstruction at Keio University School of Medicine between January 2013 and December 2016. 93 patients were excluded due to insufficient data or having undergone multiples simultaneous surgeries, and thus 74 patients were ultimately enrolled in this study. The preoperative assessment of arteriosclerotic disease was performed with the atherosclerotic cardiovascular disease (ASCVD) risk calculator, which estimates the 10-year ASCVD risk. The subjects were divided into high- and low-risk groups based on ASCVD score. Patients' clinicopathological characteristics and surgical outcomes were taken from their medical records, and statistical analysis was performed to assess the correlation between preoperative evaluation of arteriosclerotic disease and postoperative complications including AL.

Results/Outcome(s): *Results* Stratifying the 74 patients based on their ASCVD risk yielded 34 in the low-risk group (45.9%) and 40 in the high-risk group (54.1%).

There was no significant difference in clinicopathological background factors between the two groups, except for age ($p < 0.001$) and gender ($p < 0.001$). Univariate analysis revealed that the high-risk group had a significantly higher incidence of total complications (44.1% vs. 17.5%, $p = 0.013$) and AL (23.5% vs. 5%, $p = 0.03$), as well as a longer average postoperative stay (9 vs. 8 days, $p = 0.046$). Multivariate analysis adjusted for confounding factors such as age and gender confirmed that a high ASCVD score is an independent risk factor for postoperative AL (OR: 17.7, 95% confidence interval [CI]: 1.01 – 310.5, $p = 0.049$).

Conclusions/Discussion: *Discussion* Although there are several risk factors for AL, blood supply to the anastomosis is one of the most important. While ASCVD score quantifies the risk of the event in relatively large blood vessels such as the coronary and cerebrovascular vessels, it could also feasibly be used to evaluate the degree of arteriosclerotic change in marginal arteries surrounding the anastomosis, and consequently, for predicting the risk of AL in LS for CRC. *Conclusion* ASCVD score, functioning as a proxy for atherosclerotic change, may serve as a predictor for AL in LS for CRC with DST reconstruction.

PATHOLOGICAL RESPONSE IS AN INDEPENDENT PREDICTOR OF SURVIVAL IN PATIENTS TREATED WITH NEOADJUVANT CHEMORADIOTHERAPY FOR LOCALLY ADVANCED RECTAL CANCER.

P197

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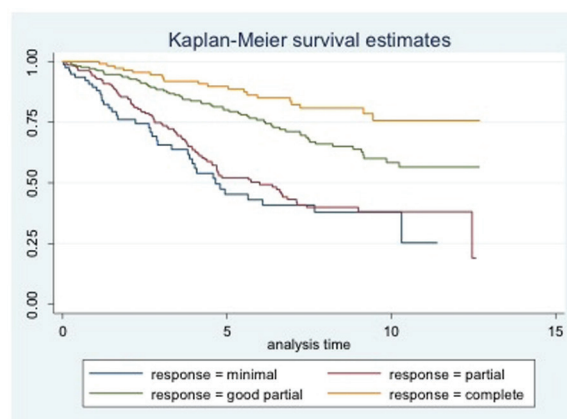
Purpose/Background: Locally advanced rectal cancer is associated with a poorer prognosis than stage equivalent colonic malignancy. With the introduction of neoadjuvant chemoradiotherapy (nCRT), survival outcomes have been reported to improve. As such, nCRT has become the mainstay treatment of patients with threatened margins in rectal cancer. The purpose of this study was to evaluate the impact of the degree of pathological response to nCRT on survival outcomes.

Methods/Interventions: This is a cohort study of patients diagnosed with primary rectal cancer who underwent nCRT and primary resection of the primary tumor between January 2005 and October 2017. Data were prospectively collected from a regional database in NHS Grampian, Scotland, UK. Pathological response was assessed by pathologists with an interest in colorectal cancer and scored by a modified Mandard pathological regression grading system. This has been categorized into complete, good partial, partial and minimal response. Overall survival and disease-specific survival estimates were analyzed using the Kaplan-Meier method. Univariate and multivariate hazard ratios of independent predictors of survival were

identified by Cox proportional hazard regression hazard analysis. Statistical significance was defined as $P < 0.05$.

Results/Outcome(s): A total of 878 patients were identified with primary rectal cancer but only 598 patients had nCRT for locally advanced rectal cancer. Ten-year overall survival for complete pathological response was 75.6% versus 37.3% for patients who had minimal response ($p < 0.001$). The ten-year disease-specific survival was 94.7% versus 43.1% for complete pathological response versus minimal response ($p < 0.001$). There is no significant difference in the overall survival (39.0% vs 37.3%, $p = 0.186$) or the disease-specific survival (49.2% vs 43.1%, $p = 0.092$) for patients who had partial versus minimal response. On adjusted multivariate analysis, pathological response remains an independent variable for overall survival (HR 0.75, 95% CI 0.59 to 0.94) and disease-specific survival (HR 0.67, 95% CI 0.50 to 0.91). Other variables including stage, lymph node harvest ratio, and quality of total mesorectal excision were also independent prognostic factors for overall survival ($p < 0.05$).

Conclusions/Discussion: A complete and good partial pathological response is associated with a more favorable survival outcome. Interestingly, mortality outcome within patients with partial response is comparable to those with minimal response. These data could add to current clinical practice by demonstrating that, in addition to stage, lymph node ratio and Extra Mural Vascular Invasion, response to therapy can be used as a predictor for outcome.



LONG-TERM OUTCOMES FOLLOWING TWO SEGMENTAL RESECTIONS AND EXTENDED RESECTION IN PATIENTS WITH SYNCHRONOUS COLORECTAL CANCER.

P198

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Purpose/Background: In patients with synchronous colorectal cancers (CRs), an extended resection with either an ileorectal anastomosis (IRA) or ileosigmoid anastomosis (ISA) is often performed. In an attempt for colonic

preservation, the alternative approach of two segmental (TS) resections with the creation of two anastomoses has been proposed. Theoretically, the latter method should give better functional outcomes with the trade-off of a higher anastomotic leak (AL) rate. The literature reports an AL rate of up to 13.2% for IRA/ISA and up to 9.5% for TS resection [1,2]. The aim of this study is to determine the complication rates of TS when compared to the traditional approach of extended resection.

Methods/Interventions: Multicentre data was retrospectively obtained from Victorian Hospitals from a prospectively maintained database (BioGrid Australia) between December 1989 and October 2018. Ethical approval was obtained from Melbourne Health (201807/3). Patients ≥ 18 years of age who underwent curative surgery for synchronous CRs confirmed on endoscopy or histology were included. An extended resection of a single anastomosis with either IRA or ISA, or two anastomoses with TS resection were performed at the surgeon's discretion. Pathological diagnosis was based on the AJCC classification of malignant tumours. Patients' demographics were abstracted. Primary outcome of interest was anastomotic leak. Secondary outcomes included other complications, length of stay, disease recurrence and overall survival. Statistical analysis was performed using SPSS (IBM Corp, Armonk, New York, USA) and Microsoft Excel (2010). Chi-squared test was used for categorical variables and Student's t-test for continuous variables. Kaplan-Meier analysis was performed to analyse survival. A p-value < 0.05 was considered significant.

Results/Outcome(s): Two hundred and ninety-one patients were included, of which 253 had extended resection (195 subtotal colectomy and 58 total colectomy) and 38 had two segmental resection. The most common combination of TS resection involved left colon and rectum (62.2%), followed by right colon and rectum (32.4%) and left and right colon (5.4%). There were no significant differences in patient demographics. There was a higher proportion of stapled anastomoses ($p < 0.01$) and defunctioning stomas ($p < 0.001$) performed in the TS resection group. No anastomotic leak was reported in the TS group which did not reach statistical significance when compared to IRA/ISA (5.1%) ($p = 0.164$). Eleven leaks occurred in subtotal colectomy with ISA (5.6%) and 2 in total colectomy with IRA (3.4%). The leak rate was 11.1% with a diverting stoma and 5.1% without a stoma in the IRA/ISA group ($p = 0.434$). Extended resection with IRA/ISA resulted in a higher rate of prolonged ileus ($p < 0.05$), while TS resection had a higher rate of superficial wound dehiscence ($p < 0.01$). Other complications and disease recurrence is shown in Table 1. Average length of stay was 9 days \pm 6.0 SD in IRA/ISA and 8 days \pm 9.3 SD in TS resection group. Median follow up was 42.7 months (range 0-181). Locoregional recurrence occurred in 6.3% ($n = 16$) of the IRA/ISA and 2.6% ($n = 1$) of the TS resection group ($p = 0.365$), whilst distant recurrence occurred in

13.4% ($n = 34$) of the IRA/ISA and 5.3% ($n = 2$) of the TS resection group ($p = 0.153$). Kaplan Meier 5 year overall survival rate showed no statistical difference between the two groups (IRA/ISA group 82.3% vs TS resection group 78.2%, $p = 0.349$).

Conclusions/Discussion: This study is one of the largest to compare TS resection to extended resection with IRA/ISA for synchronous colorectal cancers. TS resection is a safe alternative to extended resection with a comparable anastomotic leak rate, recurrence and 5 year overall survival. References: 1. Segelman J, Matsson I, Jung B, Nilsson P., Palmer G, Buchli C. Risk factors for anastomotic leakage following ileosigmoid or ileorectal anastomosis. *Colorectal Dis.* 2017;20(4):304–11. 2. Takatsu Y, Akiyoshi T, Nagata J, Nagasaki T, Konishi T, Fujimoto Y, et al. Surgery for synchronous colorectal cancers with double colonic anastomoses: A comparison of laparoscopic and open approaches. *Asian J Endosc Surg.* 2015;8(4):429–33.

	Total	Extended resection with IRA/ISA		Two segmental resection		P value
Surgical complication						
Leak	13	13	5.1%	0	0.0%	0.153
Prolonged ileus	49	47	18.6%	2	5.3%	0.041*
Deep wound dehiscence	3	2	0.8%	1	2.6%	0.295
Superficial wound dehiscence	3	1	0.4%	2	5.3%	0.006*
Haemorrhage	11	10	4.0%	1	2.6%	0.691
Abdominal collection	6	5	2.0%	1	2.6%	0.791
Return to theatre	10	10	4.0%	0	0.0%	0.212
Medical complication						
Chest infection	12	11	4.3%	1	2.6%	0.620
DVT/PE	1	1	0.4%	0	0.0%	0.698
Cardiac	16	13	5.1%	3	7.9%	0.487
Recurrence	46	43	17.0%	3	7.9%	0.152

Table 1: Post-operative complications and recurrence following extended resection with IRA/ISA and TS resection. IRA=ileorectal anastomosis, ISA=ileosigmoid anastomosis, TS=two segmental, DVT=deep venous thrombosis, PE=pulmonary embolism, *significant $P < 0.05$

APPLICATION OF TRANS-RECTAL EXTRACTION OF SPECIMEN WITH DOUBLE STAPLING ANASTOMOSES OF 3D LAPAROSCOPIC RESECTION IN MIDDLE RECTAL CANCER.

P199

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Purpose/Background: To explore the application of Trans-Rectal Extraction of Specimen with Double Stapling Anastomoses of 3D laparoscopic resection in middle rectal cancer.

Methods/Interventions: The clinical data of 123 cases of middle rectal cancer operated in department of gastrointestinal surgery from 2016 June to 2018 Mar were retrospectively analyzed. There were 76 males and 47 females. The average age was (59.8 \pm 11.6) years. There were 31 cases with stage T1 tumors, 30 cases with stage T2, 50 cases with stage T3 and 12 cases with stage T4. All patients underwent laparoscopic anterior resection of rectal cancer by trans-anal specimen extraction, and the tumor was

removed by Trans-Rectal Extraction of Specimen with Double Stapling Anastomoses (TRES-DSA).

Results/Outcome(s): The average operation time was (166.8 ± 40.8) min, the average amount of bleeding was (38.6 ± 18.7) ml, the average hospitalization length after operation was (8.7 ± 1.9) d, the interval to first oral intake was (48.5 ± 6.9) h, postoperative lymph node number was (13.7 ± 6), the average tumor resection margin length was (2.2 ± 0.6cm), and postoperative complication rate was 11.3% (14/123).

Conclusions/Discussion: The application of Trans-Rectal Extraction of Specimen with Double Stapling Anastomoses of 3D laparoscopic resection in middle rectal cancer is safe and feasible.

RESPONSE TO NEOADJUVANT THERAPY IN PATIENTS WITH EARLY-ONSET RECTAL CANCER.

P200

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Purpose/Background: The incidence of rectal cancer in patients ≤50 years of age (EORC) is on the rise. The aim of this study was to evaluate the response to neoadjuvant treatment and to identify factors affecting the pathologic response in EORC.

Methods/Interventions: Data of patients ≤50 years old operated for rectal cancer after neoadjuvant treatment from January 2008 to 2018 were collected from prospectively maintained databases from two Italian referral centers. Data were compared to patients aged ≥60 (control group).

Results/Outcome(s): Out of 219 EORC diagnosed in the time period, 114 (52.3%) underwent a neoadjuvant treatment: 4/114 (3%) a short-course radiotherapy, 110/114 (97%) radio-chemotherapy per protocol. Among controls, 108/500 (21.6%) underwent a neoadjuvant treatment: 6/108 (5.5%) a short-course radiotherapy, 102/108 (94.5%) radio-chemotherapy per protocol. Mean age was 39 and 72.5 years respectively. Males were prevalent in both groups representing 60% of patients. EORC patients had significantly more locally advanced tumors at presentation (13.3% vs 5.2%; p=0.032) and more distant metastases at diagnosis (34.3% vs 11.1%; p<0.0001). Mean distance of the tumor from anal verge was 6 cm in EORC and 6.4 cm in control group (p=0.98). Mean number of lymph nodes examined was 21.6 (±10.4) in the EORC and 18.6 (±8.8) in the control group (p= 0.009). The rate of complete pathological response (ypT0N0) (13.1% vs 2.9%; p=0.001), the presence of lymphovascular invasion (34.3% vs 21.2%; p=0.037), mean number of harvested lymph nodes (22.81 vs 18.68; p=0.009) and mean number of positive nodes (1.48 vs 1.38; p= 0.06) were higher

in EORC group. The proportion of patient with Tumor Regression Grade (TRG) 4 (complete regression) was comparable in the 2 groups (21.2% vs 16.6%; p= 0.59); while a significantly higher proportion of TRG 0-1 (regression < 25%) was observed in the EORC group (20% vs 3.2%; p=0.03). At multivariate analysis factors associated with no tumor regression were adverse histologic features (i.e. mucinous pattern), lymphovascular invasion, stage at diagnosis and percentage of lumen occupied by the tumor.

Conclusions/Discussion: The rate of response to neoadjuvant treatment appears similar in patients with EORC to patients ≥60 years. However, EORC have a significantly higher rate of complete no response (TRG 0-1). Mucinous histology, lymphovascular and perineural invasion, higher stage at diagnosis and bulky circumferential tumors have been identified at multivariate analysis as factors associated with a decreased response to neoadjuvant therapy.

A NEED UNMET: DESPITE AN INCREASE IN ROBOTIC RECTOPEXY, HALF OF FEMALE RECTAL PROLAPSE REPAIRS IN THE UNITED STATES MAY FAIL TO ADDRESS MULTI-COMPARTMENT PELVIC ORGAN PROLAPSE.

P201

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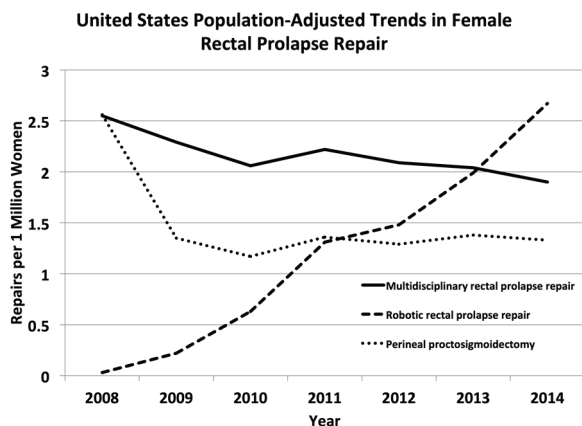
Purpose/Background: Female patients with full thickness rectal prolapse have multi-compartment pelvic organ prolapse (POP) in over one third of cases, yet the proportion of patients receiving multidisciplinary surgical repair has not been defined. Performing robotic abdominal procedures for rectal prolapse repair may facilitate the technical demands of rectopexy through improved visualization and dexterity. However, utilization of robotics surgery for rectal prolapse repair has not been described in the United States population. We hypothesize that the introduction of robotics surgery will influence an increase in abdominal rectopexies and an increase in the utilization of multidisciplinary surgical management. A national administrative database will be used to evaluate these trends and identify opportunities for quality improvement.

Methods/Interventions: The International Classification of Diseases, Ninth Revision (ICD-9) procedure codes were used to identify all patients receiving elective perineal proctosigmoidectomy (48.49), abdominal or other rectopexy (48.75, 48.76) for rectal prolapse (ICD-9 diagnosis code: 569.1) in the Nationwide Inpatient Sample from 2008 to 2014. Concurrent gynecologic and urologic procedures such as hysterectomy, sacrocolpopexy or bladder procedures were identified using procedure codes and such procedures performed with rectal prolapse repair were deemed multidisciplinary. Robotic assisted rectopexy was assigned using the designated ICD-9 procedure code

introduced in 2008. Trends in the utilization of robotic assistance and multi-disciplinary surgical procedures were evaluated. Logistic regression was performed to identify independent predictors of multidisciplinary surgical management in female patients.

Results/Outcome(s): In total, 31,610 patients underwent rectal prolapse repair; 29,178 (92%) were female. The total number of surgical repairs for female rectal prolapse decreased from 26.1 to 25.2 procedures per million women ($p < 0.01$) during the study period. The proportion of female patients treated with perineal proctosigmoidectomy decreased from 19% of repairs in 2008 to 10% of repairs in 2014 ($p < 0.01$). Robotic assisted procedures rose from 0.2% of female prolapse repairs in 2008 to 21% in 2014 ($p < 0.01$). Yet, the proportion of concomitant rectal prolapse repairs with multidisciplinary pelvic organ prolapse procedures decreased from 19% (19% gynecologic, 6% urologic) of repairs in 2008 to 15% (14% gynecologic, 4% urologic) of repairs in 2014 ($p < 0.01$). Independent predictors of a multidisciplinary procedure included: earlier procedure year (OR: 1.1; 1.0-1.1), younger age per decade (OR: 1.1; 95% CI: 1.0-1.1), primary or secondary private insurance (OR: 1.6; 95% CI: 1.4-1.9), Western hospital region (OR: 1.7; 95% CI: 1.3-2.1), urban teaching hospital setting (OR: 1.8; 95% CI: 1.2-2.7) and non-perineal proctosigmoidectomy repair (OR: 3.1; 95% CI: 2.1-4.4).

Conclusions/Discussion: Overall, the population adjusted rate of rectal prolapse repair for women in the United States has fallen over the study period. Despite the increased utilization of robotic and abdominal approaches for rectopexy in females, the number and proportion of multidisciplinary repairs has declined. There remains a gap between the incidence of multicompartiment pelvic organ prolapse and the proportion of concomitant rectopexy and multidisciplinary pelvic organ prolapse repair. This highlights an opportunity for quality improvement through multidisciplinary evaluation and treatment.



REDUCED-PORT LAPAROSCOPIC SUTURE RECTOPEXY USING A NOVEL MAGNETIC RETRACTOR.

P202

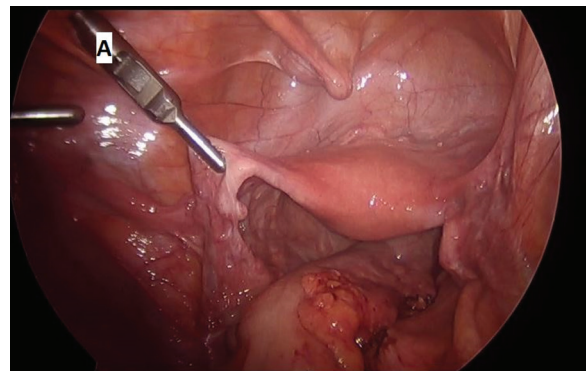
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Purpose/Background: A transabdominal approach with rectopexy is the preferred repair of rectal prolapse due to a low recurrence rate. Laparoscopic fixation of the rectum is feasible and associated with low morbidity. Visualization during low pelvic dissection is essential for complete mobilization of the rectum. In this study, we present our experience using a magnetic tissue retractor for laparoscopic suture rectopexy.

Methods/Interventions: Eight consecutive patients undergoing laparoscopic suture rectopexy at a single institution were retrospectively analyzed. A magnetic retractor was used as an adjunct for tissue retraction to maintain visualization in the pelvis during posterior dissection of the rectum and suture rectopexy. Patient demographics, intraoperative factors, and postoperative outcomes were analyzed. Laparoscopic suture rectopexy was performed using three ports.

Results/Outcome(s): All eight patients were female with mean age of 68 years (range 57-84) and BMI of 24 Kg/m² (range 17-28). The magnetic retractor was used in every case to retract the uterus and colon. Laparoscopic suture rectopexy was completed in all patients using three ports without the need for conversion to open. Average operative time was 196 minutes (range 131-270), and average estimated blood loss was 27.5 ml. No intraoperative complications were reported. All patients were discharged on postoperative day 1. One patient required catheter replacement for urinary retention. No postoperative recurrences were noted at 30-day follow-up.

Conclusions/Discussion: Reduced-port laparoscopic suture rectopexy using a magnetic retractor is effective and safe. The magnetic retractor offers the ability to effectively retract tissue without the need for additional ports.



Magnetic device (A) retracting the uterus towards the anterior abdominal wall.

PUDENDAL NERVE CRYOABLATION FOR CHRONIC PELVIC PAIN.

P203

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Purpose/Background: Pudendal neuralgia accounts for 4% of those with chronic pelvic pain. It is the most common cause of chronic perineal pain, and is a significant cause of impaired quality of life. Early treatment is associated with a better prognosis, and should be stepwise beginning with behavior modification, pelvic physical therapy to down-train overactive pelvic floor muscles, and pharmacologic agents. Image-guided pudendal nerve blocks are effective but not durable. Patients who gain temporary relief from nerve blocks may have a durable response to CT guided cryoablation. This study evaluates the efficacy and outcomes related to pudendal cryoablation in the setting of refractory neuralgia. Primary outcomes are reduction in pain scores and improved pain-related quality of life scores. Results will be used to develop a protocol to treat refractory pudendal neuralgia at Greenville Health.

Methods/Interventions: This is a prospective cohort study of all patients presenting with refractory pelvic pain to the Colon and Rectal Surgery group at Greenville Health from August 2018 to July 2019. All patients with a diagnosis of refractory pudendal neuralgia will be referred to interventional radiology for cryoablation. A diagnosis of true pudendal neuralgia is made based on the Nantes criteria; all 5 inclusion and no exclusion criteria must be met. Inclusion criteria are: 1) Pain is in the area innervated by the pudendal nerve extending from the anus to clitoris; 2) Pain is more severe when sitting; 3) Pain does not awaken patients from sleep; 4) Pain is relieved by diagnostic pudendal block; and 5) The patient has no objective sensory impairment. Exclusion criteria are: 1) Pain is located exclusively in the coccygeal, gluteal, pubic, or hypogastric area (without pain in the area of distribution of pudendal nerve); 2) Pruritus; 3) Exclusively paroxysmal pain; or 4) Abnormalities on any imaging test (eg, MRI, computed tomography) that might explain the pain. Demographics, risk factors, and pain history are performed. The Brief Pain Inventory (BPI) is used to calculate pain score pre-ablation and post-ablation at 24 hours, 45 days, and 6 months.

Results/Outcome(s): This study was based on three patients who underwent pudendal nerve cryoablation at our institution. The first was a 59 year old male who underwent proximal right sided pudendal nerve cryoablation. Unfortunately, his pain did not improve despite a positive response after his block, and he underwent MR neurography in planning a second cryoablation at the level of the ischial spine, as well as proximal left pudendal nerve cryoablation and botox injection in the levator ani muscle. The second patient was a 34 year old male with severe rectal spasm and pain s/p LAR for stage II rectal

cancer. After bilateral pudendal cryoablation, his symptoms improved by 80%. The third patient was a 70 year old female who underwent bilateral pudendal cryoablation, which was complicated by persistent saddle anesthesia. Her pain, however, improved from a 6-9/10 to zero, with occasional 1-2/10 with BMs.

Conclusions/Discussion: Data collection is ongoing. Pudendal cryoablation may offer reduced pain and improved quality of life for refractory pudendal neuralgia.



Figure 1. CT-guided Cryoablation of right pudendal nerve

SURGERY FOR PELVIC FLOOR DISORDER: ANALYSIS OVER TWO DECADES IN A UK COMMUNITY HOSPITAL.

P204

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Purpose/Background: Surgery for Pelvic Floor Disorders may be challenging particularly in the elderly. The aim of our study was to evaluate the outcome of rectal prolapse surgery in a single centre in Dorset, England, where 28% of its population is aged ≥ 65 .

Methods/Interventions: A retrospective study of all patients who underwent rectal prolapse surgery between 1995- 2018.

Results/Outcome(s): 211 surgical interventions were performed. 70% of patients were over 70 years with a median age of 76 (range 24-99). Approaches were abdominal (n=140) vs. perineal (n=71). 105/140 were laparoscopic ventral mesh rectopexy (LVMR), median age of 74 and average length of stay (LoS)= 4d. 56/71 of perineal operations were Delormes with or without Thiersch augmentation, median age 80 and LoS= 6d. 60 synthetic and 44 biologic meshes were used. The median age of patients with biological and synthetic meshes were 66 and 80 years old. Recurrence rate of biological mesh was 18.2% (8/44) vs. synthetic mesh was 8.3 % (5/60) (p= 0.114). Recurrence occurred in 14/105 (13%) of LVMR and 19/56 (33%) of Delormes with or without

Thiersch ($p=0.03$). 19/105 LVMRs had complications. 3 patients were readmitted with port site pain and ongoing constipation. The rest included 4 patients with early recurrence, 4 pneumonia, 3 complications from underlying medication conditions, 2 ileus, 2 urinary tract infection and 1 had bleeding. No mesh erosion was reported in any of the cases. 13/56 patients with Delormes procedure had post-operative complications. The complications were 3 post-operative bleeding (5.4%), of which 1 patient required surgical intervention. The rest included 4 early recurrence, 2 urinary retention, 2 medical complications, 1 delirium and 1 wound infection. In the entire cohort, 20 patients underwent ≥ 2 rectal prolapse operations due to recurrence. 9/20 required re-operations within one year.

Conclusions/Discussion: We have shown that LVMR can safely be performed in a community hospital with very minimal complications and rates of recurrence, with no procedure related mortality. Perineal approaches are suitable alternatives in frail patients to restore anatomy and function.

SACRAL NERVE STIMULATION CAN IMPROVE FECAL INCONTINENCE IN PATIENTS WITH PRIOR LOW ANTERIOR RESECTION.

P205

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Purpose/Background: Sacral nerve stimulation has been demonstrated as an effective and durable treatment for fecal incontinence. Patients who develop fecal incontinence following low anterior resection are a unique subpopulation in which sacral nerve stimulation is understudied. The etiology of fecal incontinence in this context is multifactorial and may include decreased rectal capacitance and pelvic nerve injury resulting from partial proctectomy. Sacral nerve stimulation may be of benefit to patients with history of low anterior resection.

Methods/Interventions: A database of patients who underwent sacral nerve stimulator implantation (Interstim by Medtronic) at the Colon and Rectal Clinic of Orlando from 2012 to 2018 was retrospectively compiled. Billing codes for stage 1 (temporary implant) and stage 2 (permanent implant) were used to identify patients. The

electronic medical records for each of the patients identified were reviewed. Demographic information, obstetric history, past surgical history, medications taken for fecal incontinence, and Wexner Cleveland Clinic Incontinence Scores taken on initial presentation and at clinic follow up visits were recorded. Patients were separated into those who had a history of low anterior resection prior to sacral nerve stimulator implantation and those that did not. The Wilcoxon signed-rank test was performed to compare Wexner Cleveland Clinic Incontinence Scores before and after sacral nerve stimulator implantation. Characteristics of patients with and without history of low anterior resection prior to sacral nerve stimulator implantation were compared with Fisher's exact test and the Student's t-test for categorical and continuous variables, respectively. Pre-operative manometry for patients with history of low anterior resection were recorded.

Results/Outcome(s): Query of the Sacral Nerve Stimulation Implantation Database at the Colon and Rectal Clinic of Orlando identified 59 patients who underwent sacral nerve stimulator implantation between 2012 and 2018. Twenty two patients were excluded due to inadequate documentation of Wexner Cleveland Clinic Incontinence Scores for a total of 37 patients. Nine patients had a history of low anterior resection prior to sacral nerve stimulator implantation. Manometry prior to nerve stimulator placement in these patients with prior low anterior resection showed an average resting pressure of 13.5 mmHg (normal is 50-70 mmHg) and average squeeze pressure of 29.5 mmHg (normal is 100-180 mmHg) with an average volume of air needed to elicit rectal sensation of 40.4 mL (normal is 10-30 mL). Demographic factors including age, gender, ethnicity, obstetric history, and anorectal surgical history were similar between both groups. Mean age in the groups with and without history of low anterior resection were 69.6 ± 11.0 years and 69.3 ± 13.3 years, respectively. 66% were female in the low anterior resection group and 82% were female in the group without low anterior resection. The groups were statistically different in that patients with history of low anterior resection prior to nerve stimulator implantation were more likely to have received pelvic radiation (44% versus 11%) and were more likely to have been taking medications for fecal incontinence prior to the procedure (55% versus 18%). Of the 28 patients without history of low anterior resection, the preoperative and postoperative

P204 Pelvic Floor Surgery

Surgical approach	LVMR (Abdominal)	Delormes (Perineal)
No of patients	105 (140)	56 (71)
Age (median)	80	74
Recurrence (%)	14 (13.3%)	19 (33.9%)
Length of stay (days)	6	4
Complications	19 (18%)	13 (23%)

median incontinence scores were 13 (range 9-20) and 12 (range 1-16), respectively ($p < 0.05$). The patients with prior low anterior resection had pre-implantation and post-implantation median incontinence scores of 15 and 10, respectively ($p < 0.05$). Two patients in this group had a coloanal anastomosis. One had no improvement with temporary sacral nerve stimulator placement and did not go on to have a permanent stimulator placement. The other patient had an improvement of her Wexner score from 15 pre-operatively to 11 post-operatively with a score of 12 after 23 months of follow up. The patient took diphenoxylate and atropine medication prior to nerve stimulator placement and did not require any medications for fecal incontinence after stimulator placement.

Conclusions/Discussion: Patients who suffer from fecal incontinence following low anterior resection may benefit from sacral nerve stimulator implantation. These patients have objective abnormalities on manometry with decreased mean resting and mean squeeze pressures and increased rectal sensation thresholds. Sacral nerve stimulation should be studied in greater detail in patients with low anterior resection.

IT TAKES OF VILLAGE: THE FIRST 100 PATIENTS SEEN IN A TRUE MULTIDISCIPLINARY PELVIC FLOOR CLINIC.

P206

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Purpose/Background: Pelvic floor dysfunction is a complex issue that involves multiple organ systems often resulting in reduced quality of life (QOL) for patients. Given the complexity of these issues individual providers are often limited in their ability to treat these conditions independently. Patients may see multiple providers at different appointments and receive unnecessary or redundant tests. To overcome these challenges, we have embraced a bi-monthly multidisciplinary programmatic approach to these complex problems. As part of this approach, prior to being clinically assessed, patients are discussed in a multidisciplinary conference with representatives from

specialties including behavioral health, colorectal surgery, gastroenterology (GI), physical medicine and rehabilitation (PM&R), physical therapy (PT), urogynecology and urology. In the following we report on our successful implementation of this approach with our first 100 patients.

Methods/Interventions: We reviewed patients from a prospectively collected database from 12/2017 through 10/2018. After IRB approval, we abstracted demographic as well as clinical variables from the first 100 new patient visits into REDCap (Research Electronic Data Capture) and performed descriptive statistical analyses.

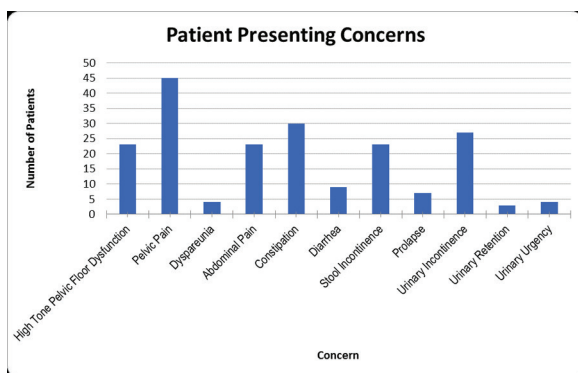
Results/Outcome(s): The vast majority of the patients seen were female (93). Over half were white (64), nearly a third black (28), and the remaining were self-described as other or Asian (8). 11 were Hispanic. Mean age was 49 (± 17.4), mean BMI was 27.5 (± 7.2) and 27 were obese ($BMI \geq 30$). Nearly half (41) had chronic conditions such as hypertension and diabetes and 23 were tobacco users. The presenting concerns are listed in Figure 1, with the most common being pelvic pain (45). 76 patients had more than one presenting symptom. 38 patients suffered from mental illness (ICD 10 Diagnoses), 23 of which had multiple diagnoses. A quarter of the patients were taking narcotic pain medication prior to their first visit. Referring patterns were diverse; the most common referring specialties included colorectal surgery ($n=28$) and obstetrics/gynecology ($n=15$). 11 patients in this clinic were entirely new to our healthcare system. Patients travelled a mean distance of 24 (± 32.4) miles between home and the clinic; 4 patients travelled over 100 miles. Median number of providers seen per visit was 2, although 5 patients were seen by 4 providers at a single visit. The most common specialties seen were GI (56%), followed by PM&R (45%), PT (31%), urogynecology (25%), behavioral health (19%), urology (18%), and colorectal surgery (13%). Interventions after initial assessment included: imaging for 15 patients (abdominal x-rays for 12 patients, computed tomography (CT) pelvis for 2 patients, and pelvic ultrasound for 1 patient); scheduled procedures for 30 patients (15 anorectal manometry, 4 urodynamics, 3 EGD, 3 colonoscopy, 2 defecography, 2 cystoscopy, 1 flexible sigmoidoscopy, 1 pessary); in-office procedures for 9 patients (6 post void residuals, 2 anoscopy, 1 incision and drainage of perianal abscess); laboratory tests for 19 patients; and

P205 Sacral Nerve Stimulator Implant Outcomes with and without Prior History of Low Anterior Resection

	Preoperative Wexner Cleveland Clinic Incontinence Score (median, range)	Postoperative Wexner Cleveland Clinic Incontinence Score (median, range)	Wilcoxon signed-rank test
History of Low Anterior Resection (n = 9)	15 (6-10)	10 (0-20)	$p < 0.05$
No History of Low Anterior Resection (n = 28)	13 (9-20)	12 (1-16)	$p < 0.05$

medications prescribed for 64 patients. Diet modifications were recommended to 10 patients and behavioral therapy to 8. PT was prescribed for 68 patients and surgery was recommended to 5 patients. 57 patients have returned to the clinic or have followed up with individual providers in their clinics. At follow up visit, 13 patients were prescribed a new medication, 4 patients were scheduled for surgery and 8 patients were newly prescribed PT.

Conclusions/Discussion: In our cohort, we cared for patients with complex pelvic floor dysfunction. The majority of patients had multiple concerns, a high percentage of mental health needs as well as chronic narcotic use. A multidisciplinary program provides a comprehensive resource for patients with pelvic pathologies that have proven challenging in other contexts. While there are inherent challenges to consistently dedicating providers to a bimonthly half-day clinic, there are likewise significant rewards. In the first 100 patients, this clinic generated significant downstream revenue as it generated referrals from 11 patients who were new to our institution. Additionally, the majority of patients had imaging, procedures or physical therapy scheduled. Furthermore, over half of patients returned for follow-up, yielding 157 patient encounters in first 10 months of the program. The most common referring providers to the program are those from specialties who participate in the clinic, indicating that awareness of the program and the services provided results in a more integrative approach to patient care. Further analysis beyond proof of concept will illustrate the benefits of a truly multidisciplinary approach with continued growth, increased revenue, improved clinical outcomes, development of evidence-based protocols and enhanced patient satisfaction, including better QOL.



SURGICAL TREATMENT OF SYMPTOMATIC RECTOCELE: INITIAL EXPERIENCE WITH A TRANSVAGINAL TECHNIQUE WITH BIOSYNTHETIC ABSORBABLE MESH.

P207

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Purpose/Background: Rectoceles are defined as herniation of the anterior rectal wall into the vagina due to lack of support of the rectovaginal septum. The main cause is loss of resistance of the Denonvilliers fascia and proper rectal fascia. Reinforcement with mesh has been widely performed, but use of biosynthetic absorbable mesh has not been published. We describe four patients who were operated due to symptomatic rectoceles, submitted to a transvaginal repair with biosynthetic absorbable mesh.

Methods/Interventions: Four patients with symptomatic rectocele confirmed by rectal and vaginal digital examination. All patients felt pressure in the vagina and had to strain during defecation. Two of these patients reported that they had to do vaginal pressure in order to defecate. Videodefecography was done to confirm the diagnosis. All patients underwent preoperative anal manometry. Surgery was performed with the patient in lithotomy position. A transverse incision is done in the posterior vaginal wall near the mucocutaneous transition. The vagina is separated from the anterior rectal wall up to the level of the uterine cervix, and laterally until all the rectocele is released. Two invaginating longitudinal running sutures are done to reduce the bulging on the anterior rectal wall, encompassing the Denonvillier's fascia, proper rectal fascia and rectal muscularis. A biosynthetic absorbable mesh composed of 67% polyglycolic acid and 33% trimethylene carbonate (Gore BioA®, W.L. Gore & Associates, USA) is placed over the anterior rectal wall, and fixed over the rectum with separate absorbable sutures. The vaginal mucosa is closed with separate absorbable sutures.

Results/Outcome(s): All patients were discharged in the first postoperative day. They had no complaints during a 3-month follow-up, with improvement in defecation and in the vaginal pressure sensation, with no further need to press the vagina to allow defecation. All digital rectal and vaginal examinations performed 30 and 90 days after surgery were normal. All patients did a new defecography after 3 months of surgery, with complete rectocele resolution.

Conclusions/Discussion: Surgical treatment of rectocele through a transvaginal approach, with reinforcement with a biosynthetic absorbable mesh, might be a safe, low-risk alternative to improve obstructed defecation and vaginal discomfort. The use of this type of mesh could reduce the risk of infections in a contaminated surgical field, avoid late symptoms due to the presence of a foreign body, and assure the necessary reinforcement in a situation of impairment of fascia resistance.

SACRAL NERVE STIMULATOR IN THE TREATMENT OF RECTAL PROLAPSE.

P208

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Purpose/Background: Objective: Rectal prolapse is a common disorder that can afflict up to 1% of all adults over the age of 65. Once a prolapse has occurred, 50-75% also complain of fecal incontinence from various causes. Some patient's fecal incontinence resolved after 6 months from surgical repair but for those with long term prolapse, fecal incontinence persist and does not improved. This can be very distressing for patients. Sacral nerve stimulator (SNS) have long been placed initially for urinary incontinence in 1988 and subsequently for fecal incontinence since 1995, with good success. With the high incidence of fecal incontinence associated with rectal prolapse, we evaluate the placement of SNS for patient with complaint of rectal prolapse prior to their surgical repair, to assess if improving sphincter tone and continence will improve their prolapse and spare them from a surgical pexy and or resection.

Methods/Interventions: Method: a prospective study of patients who presented with rectal prolapse was assessed with physical exam, documentation of prolapse, Wexner incontinence score as well as anal manometry. Patient was then offered SNS prior to their surgical repair. If SNS fails, surgical repair included laparoscopic/robotic rectopexy, laparoscopic/robotic rectopexy with low anterior resection, and Altmeiyer repair. SNS were placed in a single stage and assessed at 1 month, 3 months, 6 month and a year then yearly with history and physical exam as well as anal manometry. If there was no improvement in the frequency or amount prolapsed, the patient would then undergo a surgical repair.

Results/Outcome(s): Results: 13 patients (female median age 83) underwent placement of SNS after presenting with rectal prolapse. Of these, 3 of 12 (25%) patients achieved treatment improvement at 3 months and success without daily prolapse after an average of 12 months. One of the 3 had an perineal resection a month prior by another colorectal surgeon and proceeded to prolapse 36 days later. The other 9 patients went on for abdominal or perineal repair based on medical problem and patient preference. 8 patient had Altmeiyer, 1 laparoscopic resection with rectopexy and 1 laparoscopic rectopexy alone. The median follow-up of 22 months (range 3-40). Of the 3 patients who did not undergo repair, one had 2 episodes of prolapse with a bouts of severe constipation but improved and yet to have surgical intervention. None of the devices needed to be explanted.

Conclusions/Discussion: Conclusion: SNS can be effective for those with rectal prolapse whose prolapse is less than 3cm in length. It provides a less invasive options for patients improving their fecal

incontinence and prolapse without a more invasive surgery. Unfortunately this was only successful in 3 patients with short segment prolapse. The numbers are too low at this time without a larger trial. Currently, it cannot replace neither abdominal or perineal resection but does offer an option to both treat fecal incontinence as well as rectal prolapse. Despite the low numbers, SNS can be considered before undertaking resection for short segment rectal prolapse.

MANAGEMENT OPTIONS AND OUTCOMES FOR RECTOVAGINAL FISTULA: A POPULATION-BASED ANALYSIS OF 70 PATIENTS.

P209

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Purpose/Background: The management of rectovaginal fistula (RVF) remains a controversial and challenging topic. The healing rate varies depending on the etiology, characteristics of fistula, and treatment options. The present study aims to access the management options and outcomes for RVF in a single center.

Methods/Interventions: All patients with RVF underwent surgical treatment between November 2012 and June 2018 in the Sixth affiliated hospital of Sun Yat-sen University was retrospectively analyzed. The clinical data were included as follow: age, etiology, number of prior repairs, diverting stoma, duration of fistula symptoms, location of the fistula (defined as low, in close approximation to the vaginal fourchette; middle, between the cervix and the vaginal fourchette; and high, close to the cervix). Operative options (including stoma) and outcomes were also collected. The fistula healing defined as the absence of any vaginal passage of faces, flatus or mucous discharge and/or absence of the fistula tube by defecography or MRI. Furthermore, univariate and multivariate analyses were performed to identify prognostic factors for fistula healing.

Results/Outcome(s): Ninety-eight patients with RVF were eligible, and then 28 patients were excluded due to loss of follow-up or refusal of follow-up. Seventy consecutive patients were identified in this study. Mean age at the time of RVF diagnosis was 43.0±17.0 years (1-84 years). The etiology of RVF included secondary to surgery in 57 cases (73.1%), congenital in 12 cases (15.4%), obstetrical in 5 cases (6.4%), infectious in 2 cases (2.6%), IBD in 1 case (1.3%), and unknown in 1 case (1.3%). The mean fistula duration time was 45.9±95.2 months (0-456 mo.). The mean number of previous surgical procedures for RVF was 0.55±0.9 (0-3). The most of fistulas were low or middle (56/70, 81.2%). The fistula opening in the anterior rectal wall was positioned 3.3±1.9 cm (0.6-11.0 cm) from anal verge while 2.4±1.5cm (0.5-6.2cm) from the vaginal

introitus in the posterior vaginal wall. The diameter of fistula was 1.1 ± 0.9 cm (0.2-5 cm). Seventy patients underwent 78 operations, including trans-anal repair (n=12), traditional trans-perineal repair (n=9), staple trans-perineal repair (n=15), trans-vaginal repair (n=13), trans-abdominal repair (n=12), stoma only (n=15), and other (n=2). Mesh was used in 5 procedures. Sphincteroplasty was combined in 13 procedures. Trans-anal drainage was used in 36 procedures and the mean stay time was 8.7 ± 3.5 d (4-22d). A urinary catheter was used in 72 procedures. Forty-five patients had stoma due to primary disease or treatment for RVF. After a mean follow-up of 36.6 ± 18.9 months (4-71 months), the healing rates were 75.0% in trans-abdominal repair group, 58.3% in the trans-anal repair group, 100% in the staple trans-perineal repair group, 44.4% in the traditional trans-perineal repair group, and 23.1% in the trans-vaginal repair group. Moreover, the overall fistula healed rate was 68.6% (48/70). Univariate analysis showed that Staple trans-perineal repair ($P=0.001$), trans-anal drainage ($P=0.154$) was significant protective factors while trans-vaginal repair ($P=0.002$) and stoma ($P=0.025$) was a significant risk factors for healing (Table1). After multivariate analysis, trans-vaginal repair ($P=0.023$; OR:5.5;

95%CI: 1.27-24.07) was identified as an independent prognostic factor of healing.

Conclusions/Discussion: Different procedures showed various outcome, and staple trans-perineal repair had a favorable result for RVF. Surprisingly, the trans-vaginal repair may be a risk factor for the better outcome, which is considered as a common procedure for RVF.

CLINICAL IMPLICATION OF SOLITARY RECTAL ULCER SYNDROME.

P210

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Purpose/Background: Solitary rectal ulcer syndrome (SRUS) is a chronic, benign disorder of young adults, affecting the rectum, often related to straining or abnormal defecation, Which is an infrequent or an underdiagnosed disorder. This study assessed, the clinical endoscopic, and histopathological characteristics for (SRUS).

Methods/Interventions: During the period of June 2007 to July 2018, more than 100 cases of solitary rectal

P209 Table 1: Univariate Analysis of Prognostic Factors of 78 Procedures Performed for RVF

Variables	Healing (n=48)	Non-healing (n=30)	P value
Age, y	42.0±16.5	44.7±17.7	0.488
Etiology			
Secondary to surgery	34(70.8)	23(76.7)	0.572
Congenital	9(18.8)	3(10.0)	0.472
Obstetrical	4(8.3)	1(3.3)	0.644
Infectious	1(2.1)	1(3.3)	1.000
IBD	0	1(3.3)	0.385
Unknown	0	1(3.3)	0.385
Procedure			
Trans-abdominal	9(18.8)	3(10.0)	0.472
Trans-vaginal	3(6.3)	10(33.3)	0.002#
Trans-anal	7(14.6)	5(16.7)	1.000
Staple trans-perineal	15(31.3)	0	0.001#
Traditional trans-perineal	4(8.3)	5(16.7)	0.449
Stoma only	9(18.8)	6(20.0)	0.892
Other	1(2.1)	1(3.3)	1.000
Low or middle fistula Location	37(86.0)	19(73.1)	0.309
Patients with Stoma	25(53.2)	22(80.0)	0.025#
Trans-anal drainage	26(54.2)	10(37.0)	0.154#
Urinary catheter	47(97.9)	25(92.6)	0.293
Distance in anorectum (cm)	3.3±1.9	3.3±2.0	0.975
Distance in vagina (cm)	2.3±1.4	2.7±1.6	0.484
Diameter of fistula (cm)	1.2±1.0	1.0±0.8	0.277
Previous surgical procedures (≥1)	19(39.6)	8(28.6)	0.333
Fistula duration time (mo.)	51.7±107.3	32.0±57.2	0.453

Number of cases (percentage of cases).

Significant P values after univariate analysis ($P<0.2$).

ulcer syndrome were diagnosed and confirmed by histopathology. The study was made retrospectively reviewing their outpatient and inpatient records in Jordan hospital. They were diagnosed based on clinical, endoscopic, and histopathological features of SRUS. From all patients biopsy was taken, which offered good histopathological specimen for diagnosis, and behavioral modification which high fiber diet and bulk laxatives, saving the patients major resection and major operations.

Results/Outcome(s): SRUS is a chronic, benign disorder of young adults, affecting the rectum, often related to straining or abnormal defecation. The pathogenesis is not clear but mainly its related to recurrent rectal trauma and ischemia due to straining or prolapse. Usually patients present with straining, altered bowel habits, anorectal pain, incomplete passage of stools, and passage of mucus and blood. The diagnosis is made clinically, endoscopically, and histopathologically, here comes the importance of good biopsy from the clinician and the awareness of the histopathologist about this benign condition.

Conclusions/Discussion: A variety of therapies has been tried. Several therapies thought to be beneficial include topical medications, behavior modification supplemented by fiber and biofeedback, and surgery. Patient education and a conservative, stepwise individualized approach remain paramount in the management of this syndrome

DOES THE LENGTH OF THE PROLAPSED RECTUM IMPACT OUTCOME OF SURGICAL REPAIR?

P211

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Purpose/Background: The relationship between documented length of rectal prolapse and risk of recurrent prolapse following surgical intervention is not well described previously. We aimed to determine if length of rectal prolapse predicted a risk of recurrence in our patient cohort.

Methods/Interventions: Consecutive patients from a prospectively collected IRB approved data registry were evaluated. This registry included all patients from 2008 – 2016 who underwent surgical intervention for rectal prolapse at our institute. Data points analysed included prolapse length, recurrence, type of surgery & primary or secondary procedure. Statistical tests used included Chi square & Mann Whitney U.

Results/Outcome(s): There were 251 patients who had surgery for rectal prolapse during the study period. Two hundred and twenty six (90%) had full thickness prolapse. There were 213 patients (85%) who underwent their first procedure for prolapse with 40 patients presenting as a recurrent prolapse to our institute. Twenty patients had a perineal approach & 232 had an abdominal approach (resection rectopexy; n = 87, ventral rectopexy; n = 137

& posterior rectopexy; n = 7). There was a greater risk of recurrence in patients who had a perineal procedure (p = 0.02). There was also a greater risk of recurrence in patients who underwent surgery for recurrent prolapse & had a perineal procedure (p=0.01). The type of abdominal procedure (resection rectopexy, ventral rectopexy or posterior rectopexy) (p=0.5) or overall approach (laparoscopic, laparoscopic converted, open, or robotic) (p=0.2) was not significantly associated with recurrent prolapse. The median length of prolapse documented was 4cm (range: 1 – 12cm, SD: 2.17cm). The overall post-operative recurrent prolapse rate was 29.48% (74 patients) (Table 1) with a median follow up of 22 months (range: 1 – 90 months, SD: 26). There was no significant difference in rate of recurrence between those patients who had internal versus full thickness prolapse (p=0.6). There was no significant difference found for risk of recurrence based on documented prolapse length in all patients (p=0.1) & in those patients who underwent their first procedure (p=0.8) or those who underwent surgery for a recurrent prolapse (p=0.2). There was no significant relationship found for type of approach (p=0.3) or procedure performed and length of prolapse (p=0.2). Recurrent prolapse was found to be associated with having a previous sigmoid colectomy separate to a resection rectopexy (p=0.004), having a uterus in situ (p=0.01) and having had a recurrence previously (p<0.001).

Conclusions/Discussion: Patients who have had a previous sigmoid colectomy, not had a hysterectomy & who presented with a recurrent prolapse appear to be at a higher risk for recurrence. We also found that those patients who had a perineal procedure were at a higher risk of recurrence which is in keeping with previously reported literature. However the risk of recurrent prolapse following surgical intervention is not related to initial prolapse length based on our findings.

SHORT AND LONG-TERM RESULTS OF MANAGING 386 MUCOHEMORRHOIDAL PROLAPSE CASES WITH MUCOPEXY-RECTO ANAL LIFTING (MURAL), A MINIMALLY INVASIVE AND STANDARDIZED TREATMENT.

P212

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Purpose/Background: Managing grade III/IV hemorrhoidal disease with traditional excisional surgery or stapled hemorrhoidopexy have been challenging undertakings considering the risks of non-negligible complications associated with invasive techniques. The aim of this study was to assess the safety and efficacy of Mucopexy-Recto Anal Lifting (MuRAL) in treating patients affected by grade III and IV hemorrhoidal disease.

Methods/Interventions: Three hundred eighty-six patients affected by grade III and IV hemorrhoidal disease

have been enrolled in our study and underwent Mucopexy-Recto Anal Lifting (MuRAL) between May 2013 and November 2018. The method has already been described in detail by Pagano et al. [Minerva Chirurgica 2018 October; 73(5):469-74]. Arterial ligation and mucopexy involving progressive lifting have been performed at 6 positions, by following a standardized sequence (as outlined in the attached image). Six longitudinal scars anchor permanently the mucosa and sub-mucosa to the muscular wall beneath. The follow-up examinations have been carried out by independent observers as follows: a digital exploration 3 weeks after the intervention, digital exploration and proctoscopy at 3 and 12 months, repeated at a 12-month interval. Patients not following strictly the postoperative clinical examination calendar have been excluded from the study. Primary outcome measure was the recurrence rate observed in patients who completed at least 12 months of follow-up. Secondary outcome measures were: operative time, postoperative hospital stay, postoperative pain, postoperative symptoms and patient satisfaction score.

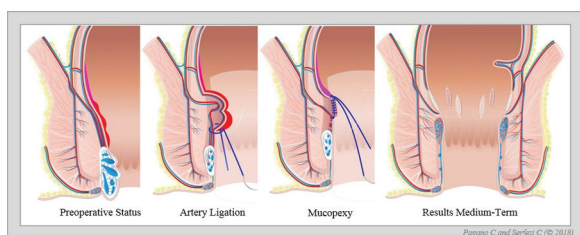
Results/Outcome(s): MuRAL has been performed on 386 patients (59.6 % male, mean age 53.9, range 26-87); 297 (76.9%) with grade III and 89 with grade IV hemorrhoids. Thirty-three (8.5%) patients had MuRAL as a revisional procedure of a previous intervention (17 stapled anopexy, 6 Milligan-Morgan, 5 MuRAL, 3 STARR, 2 THD). Mean duration of follow-up was 814 days (range 15-2007). The mean duration of the procedure was 23 minutes (range 13-45); 195 patients (53.0%) were discharged on the day of surgery and 163 (44.3%) had a one-day hospitalization; 10 patients treated with MuRAL required hospitalization > 1 day due to comorbidity. Pain NRS score (0-10) on the first, second and third postoperative day was 3.8, 2.5 and 2.2 respectively. No major complications were observed. Thirty-eight (10.3%) patients, all submitted to spinal anesthesia, had postoperative acute urinary retention. Transient fecal urgency was observed in 13 (3.4%) patients at the first follow-up. Mean time to return to normal activity was 7 days (range 2-10). At one-year follow-up 89.5% of patients reported an excellent/good satisfaction score. Operating time was

P211 Table 1.

	Recurrent (n=74)	No recurrence (n=177)	P value
Procedure Type			0.02
Abdominal	64	168	
Perineal	10	9	
Operative Procedure			0.01
Ventral rectopexy	42	96	
Resection rectopexy	18	69	
Posterior rectopexy	4	3	
Delorme	8	5	
Altemeier	2	4	
Operative Approach			0.2
Laparoscopic	20	61	
Laparoscopic converted	5	4	
Open	9	20	
Robotic	30	83	
Full vs Internal			0.6
Full thickness prolapse	66	153	
Internal prolapse	8	24	
Previous sigmoid colectomy			0.004
No	69	176	
Yes	5	1	
Previous Hysterectomy			0.01
No	72	155	
Yes	2	22	
Recurrent prolapse			0.001
No	46	165	
Yes	28	12	
Prolapse length			0.1
<4cm	30	63	
>4cm	23	41	

significantly shorter, postoperative pain lower and transient fecal urgency less frequent in patients with grade III than in those with grade IV hemorrhoids. One-year recurrence rate was evaluated in 279/386 patients (214 with grade III and 65 with grade IV disease). Recurrence was observed in 12 patients (4.3%): 7/214 (3.3%) with grade III and 5/65 (7.7%) with grade IV hemorrhoids ($P=0.12$). Two patients out of 28 (7.1%) had a second recurrence after MuRAL (1 previous MM, and 1 previous MuRAL).

Conclusions/Discussion: In our experience, Mucopexy-Recto Anal Lifting (MuRAL) with its standardized procedure management approach, offers a safe and effective treatment solution of managing grade III and IV symptomatic hemorrhoids with minimal invasivity, lowering the patient's risk of developing severe complications. The method does not cause tissue trauma, which permits to easily perform a redo-MuRAL in the event of recurrence.



RECTOURETHRAL FISTULA REPAIR WITH RECTAL ADVANCEMENT FLAP AND INTERPOSITIONAL BIOLOGICAL MESH: A CASE SERIES.

P213

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Purpose/Background: A rectourethral fistula (RUF) is a rare, complex condition that negatively impacts the patient's quality of life and poses substantial challenges in surgical intervention. In Western society, the most

common etiology for RUF is multimodal treatment for prostate cancer including radical open, laparoscopic, or robotic prostatectomy; external beam radiation; and brachytherapy. The transanal approach with rectal advancement flap and interpositional biological mesh has shown successful results in small RUFs arising post-radical prostatectomy.

Methods/Interventions: We present a series of nine patients who underwent transanal RUF repair with rectal advancement flap and interpositional biological mesh placement between January 2007 and September 2018. Retrospective chart review included demographics, operative technique, mesh type, and post-operative outcomes. Inclusion criteria consisted of the presence of post-prostatectomy or radiation-induced rectourethral fistulas. Exclusion criteria included presence of inflammatory bowel disease, rectal neoplasm, or penetrating trauma. All patients underwent surgical intervention at a single, tertiary care hospital following evaluation by a multidisciplinary team consisting of a colorectal surgeon and a urologist.

Results/Outcome(s): Out of 9 cases, 8 RUFs had no previous repairs and one was a recurrent RUF following a previous repair at an outside institution. Eight RUFs occurred following a prostatectomy. One occurred following radiation. Mean patient age was 68.2 ± 6.6 years and mean body mass index (BMI) was 25.8 ± 4.59 kg/m². Transanal approach with primary defect repair and an interpositional biological mesh was used in all cases. 8 patients had fecal diversion and all patients had urinary diversion. The mean operative time was 164 ± 58 minutes and mean length of stay was 1.8 ± 1.4 days. The only thirty-day postoperative complication was a *Clostridium difficile* infection in one patient. Two RUF recurrences were discovered three and four months following the initial repair at our institution. Both recurrences had small defects at the distal aspect of the prior repairs and were subsequently repaired using the same technique. The mean length of follow up was 5.2 ± 2.4 months. Six patients had their diverting ostomies reversed. The mean ostomy reversal time was 6.2 ± 2.9 months. One patient was lost to follow up after his RUF had healed.

P213 Table 1. Post-operative follow-up in patients after transanal rectal advancement flap and interpositional biological mesh placement.

Patient	Type of Biologic Mesh	Post-operative Complications		
		Within 30 Days (Y/N)	Length of Follow Up (months)	Recurrence (Y/N)
1	Human	N	4	N
2	Human	N	4	N
3	Human	N	8	N
4	Human	N	2	N
5	Porcine	N	8	N
6	Bovine	N	3	N
7	Bovine	N	4	Y (At 4 months)
8	Bovine	Y (C.diff infection)	9	N
9	Porcine	N	4	Y (At 3 months)

Overall, a 78% primary healing rate and 100% healing rate was observed following second interventions.

Conclusions/Discussion: Transanal repair utilizing the biological mesh appears to be a safe and effective method of rectourethral fistula repair. Further analysis with randomized control trials would be beneficial to further elucidate the benefits of this technique over other techniques.

OUTPATIENT HEMORRHOID REFERRALS TO A COLORECTAL SURGEON AND DIAGNOSTIC ACCURACY: IS IT REALLY A "HEMORRHOID?"

P214

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Purpose/Background: Hemorrhoid referrals from physicians to a colorectal surgery practice are common. Upon evaluation, patients referred for hemorrhoids are frequently found to have another pathology. Often, the true diagnosis is another benign anal condition, however initial misdiagnosis could impact treatment and effect morbidity. Mortality can be increased if a misdiagnosed benign anal condition is a malignancy. Our aim is to assess outpatient hemorrhoid referrals from physicians to a colorectal surgery practice to determine accuracy and potentially avoid diagnostic and treatment delay.

Methods/Interventions: A retrospective review identified outpatients with a referral diagnosis of hemorrhoids who were evaluated in our colorectal surgical practice from July 2018 to September 2018. All referrals were for hemorrhoids only. Primary outcome is the diagnosis documented on physical exam by a colorectal surgeon. Secondary outcomes include demographics, referring specialty, referring symptoms, and predictors of correct and incorrect diagnosis of hemorrhoids. Positive and negative predictors were identified with multivariate binary regression analysis.

Results/Outcome(s): 294 patients (51.4% female) with a mean age 52 years were referred for hemorrhoids over a 3-month period. 216 patients (73.5%) had a confirmed diagnosis of hemorrhoids by a colorectal surgeon. 78 patients (26.5%) were diagnosed with another pathology, the most common of which was anal fissure (39.7%), pruritis ani (20.5%), and perianal skin tags (15.4%). Squamous cell carcinoma was found in two patients. The majority of patients were referred by internal medicine (55.8%), gastroenterology (23.8%), and family medicine (18.7%) for symptoms of bleeding (55.8%), pain (38.4%) and prolapse (38.1%). Positive predictors of correct diagnosis include male sex, prolapse as the dominant symptom, and high BMI. Negative predictors of correct diagnosis include female sex, low BMI, and dominant symptoms of pain and pruritus. Referring specialty was not significantly associated with accuracy of diagnosis. Bleeding is not a

statistically significant positive predictor of correct diagnosis and is a non-specific symptom.

Conclusions/Discussion: The evaluation and diagnosis of anorectal pathology remains elusive regardless of referring specialty. Males with high BMI and prolapse tend to present with hemorrhoids. Female referrals with a low BMI, pain and pruritus have a higher likelihood of another anorectal pathology. Due to the difficulty of diagnosis, physicians should be encouraged to refer patients to a colorectal specialist for evaluation so that proper treatment may be initiated in a timely fashion. This is particularly important in patients who may have an anal malignancy.

Table 1: Demographics and characteristics of hemorrhoid referrals (N=294)

Age	51.93±16.88
Sex	
Males	143 (48.6%)
Females	151 (51.4%)
Race	
White	157 (53.4%)
Black	20 (6.8%)
Hispanic	67 (22.8%)
Asian	20 (6.8%)
Other	30 (10.2%)
BMI	27.63±5.56
Main symptoms at presentation	
Bleeding	164 (55.8%)
Prolapse	126 (42.9%)
Pain	114 (38.8%)
Pruritus	38 (12.9%)
Soiling	3 (1.0%)
Referring specialty	
Internal medicine	113 (38.4%)
Gastroenterology	70 (23.8%)
Family medicine	55 (18.7%)
Self referral	36 (12.2%)
Emergency medicine	10 (3.4%)
Gynecology	8 (2.7%)
Other ¹	2 (0.6%)
Dx by CRS	
Hemorrhoid	216 (73.5%)
Other diagnosis	78 (26.5%)
Fissure	31 (39.7%)
Pruritus	16 (20.5%)
Skin tag	12 (15.4%)
Abscess/fistula	4 (5.1%)
Levator spasm	3 (3.8%)
ScCa ²	2 (2.5%)
FI ³	2 (2.5%)
Rectocele	2 (2.5%)
PCPR ⁴	2 (2.5%)
Proctidentia	1 (1.3%)
Other ⁵	5 (6.4%)
Colonoscopy history at presentation	
Colonoscopy (mean age)	185 (58.3 years)
No colonoscopy (mean age)	109 (41.2 years)

¹ General surgery; colon and rectal surgery

² Squamous cell carcinoma; ³ Fecal incontinence; ⁴ Paradoxical contraction of puborectalis

⁵ Hypertrophied papilla, contact dermatitis, irritable bowel syndrome, diverticular bleed, Heyde's syndrome

EPIPLOIC APPENDAGITIS: STILL GOING UNNOTICED?

P215

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Purpose/Background: Epiploic appendagitis(EA) is an understudied diagnosis likely due to its self-resolving nature. Due to this, physicians often have little to no knowledge of the pathology, and when faced with it, are unsure of the proper treatment. Radiologic literature appears to be more robust than surgical or medical fields for this pathology, which may be a cause. We set out to investigate risk factors associated with EA and whether it is currently being diagnosed and treated appropriately at our institution.

Methods/Interventions: This was a single center retrospective case series, we queried all adult and pediatric radiologic reports read for patients at our institution between 1/2008-10/2018 containing keywords “Epiploic” or “Appendagitis”. Patient charts were reviewed for clinical course assessment. SAS was used for descriptive statistics.

Results/Outcome(s): Out of 26,961 abdominal/pelvic CT scans done for abdominal pain, 174 patients had EA (0.6%). 83 had acute EA without other probable causes and 72 patients with incidental chronic EA. All patients had abdominal pain localized to the area of the torsed appendage. The most common exacerbating factor was movement (52%, N=35), while nausea was the most common associated symptom (31%, N=26). 52% (N=44) of patients were misdiagnosed or undiagnosed for their pain. 8% (N=7) patients were admitted unnecessarily, 24% (N=20) received antibiotics or other medical treatment, and two patients received operations for chronic cholecystitis/appendicitis with acute EA in the same location. 62% (N=52) were treated conservatively with pain medication only. Common risk factors noted were obesity (mean BMI=30.8±5.5) and diverticulosis (32% incidence, N=27). Mean age was 45.7(±16.7) years with a bimodal distribution.

Conclusions/Discussion: From our study it appears that EA may be more prevalent than previously thought. EA continues to go undiagnosed or misdiagnosed at our institution, and we believe this may be the case nationally as well, causing unnecessary hospital admissions and prescriptions. Therefore, we describe a clinical picture of EA for appropriate diagnosis, as well as a descriptive statistics for associated symptoms, and possible risk factors. To our knowledge this is the largest clinical case series and first clinically descriptive study of EA.

OUTCOMES OF SURGICAL MANAGEMENT IN CHRONIC IDIOPATHIC CONSTIPATION PATIENTS.

P216

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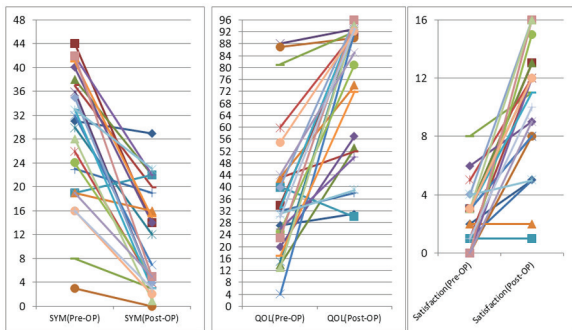
Purpose/Background: Chronic idiopathic constipation (CIC), also called primary chronic constipation, has the global prevalence of 14%. The reported prevalence of the Chinese population is estimated to be 6%. For patients with chronic idiopathic constipation, surgical intervention is considered in patients with medication treatment failure. Post-operative complications include infection, ileus, anastomosis site leakage and incisional hernia. Post-operative frequent bowel movements, urgency, clustering of bowel movements, diarrhea, are also seen in some patients. The purposes of this study were to identify the factors that may associate with better symptomatic relief from surgery, and to present the long term outcome of these patients.

Methods/Interventions: There were 25 patients diagnosed of CIC and received total colectomy and ileo-rectal anastomosis, and kept follow up at National Taiwan University hospital (NTUH) between 2001 and 2017. We use the Patient Assessment of Constipation Symptoms (PAC-SYM) questionnaire and Patient Assessment of Constipation quality of life (PAC-QOL) questionnaire for evaluation. All questionnaires (including pre-operative and post-operative) were mailed to the patient or finished by telephone interview post-operatively. Pre-operative questionnaires were finished post-operatively by recall. We reviewed the lab data, complications, image studies, surgical records, pathology reports, and questionnaire scores. All complications were listed, and defined as during admission, early (within one month after discharge), or late (exceed one month after discharge). All variables were analyzed to find out factors that were associated with better symptomatic relief. Scores were analyzed by Wilcoxon sign test. Linear regression analysis was performed to each variable. Mann-Whitney U test and Fisher exact test were used to analyze continuous variables and nominal variables respectively to compare open to laparoscopic surgery. All statistical analysis were performed using SPSS, with significance set at $p < 0.05$.

Results/Outcome(s): In total 25 patients, 92% were female. 88% patients report constipation symptoms onset at the age before 30. Mean age at operation was 35.4 years old. The oldest age at operation was 58 years old; the youngest was 24 years old. Eight of our patients had received intra-abdominal surgery before; none of them needed conversion from laparoscopic to open surgery. Mean length of stay after operation was 13.3 days, with open surgery 10.7 days and laparoscopic surgery 13.6 days, no statistical significance was noted between two groups. For the lower GI series, 84% of the patients were reported to have redundant sigmoid colon, 16% patients have loss of haustration, 64% of the patients have ptosis of T-colon into the pelvis. For the pathological findings, 60% of our patients showed positive of at least one type of neuronal abnormality, 40% of patient showed melanosis coli. Our data showed significant symptomatic relief (improvement of all three scores: PAC-SYM, PAC-QOL, satisfaction score) after surgical treatment. But we could not find a factor that is significantly associated with improvement of all scores. Only loss of haustration under low GI series showed significant association with better symptomatic relief noticed by PAC-SYM questionnaire. Age at onset younger than 30 years old, is the only factor that significantly associated with better improvement of post-operative satisfaction score. Only 6 patients had complications during admission. Three experienced ileus, and were treated with medication. One wound infection, and one blood stream infection case, all treated with antibiotics. One had intra-abdominal abscess and received CT- guide pigtail drainage. Early complications, defined as within one month after discharge, were noted in 2 cases. One was ileus and one was severe diarrhea, both were treated with medication. Late complications,

defined as one month after discharge, were noted in 9 cases. Seven of them were ileus and one was diarrhea. One of the ileus case required surgical treatment. One patient still experienced persistent constipation after the surgery, and received another scheduled operation.

Conclusions/Discussion: Since CIC is a benign disease, risk and possible complications of the surgery should be well informed. Complications that need further invasive procedure occurred in 4% of our patients. Post-operative bowel habit change may impair the quality of life in a different way. Some of our patients reported frequent bowel movements, urgency, clustering of bowel movements, and diarrhea. Post-operative anti-diarrheal agent use is needed to achieve tolerable defecation frequencies in 80% of our patients. For properly selected patients with chronic idiopathic constipation, total colectomy and ileo-rectal anastomosis can provide significant improvements of both symptoms and quality of life. The treatment aims at symptomatic improvement, but not cure.



ATHERMAL FISSURECTOMY WITH PLASTIC PRIMARY WOUND CLOSURE IN CHRONIC FISSURA-IN-ANO - PRESENTATION OF A NEW TECHNIQUE.

P217

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Purpose/Background: We present a new technique for the surgical treatment of chronic fissura-in-ano. Chronic fissura-in-ano is successfully conservatively treated in most patients by the use of a glyceryl trinitrate or diltiazem ointment. In some cases, the existing scar tissue prevents wound healing by forming a pocket or cavity so that surgical therapy must be performed. Numerous different methods are used, e.g. surgical debridement, open fissurectomy with wound healing by secondary intention and fissurectomy with wound closure. In our experience, wound closure after excision of the fissura leads to primary wound healing only in few cases.

Methods/Interventions: Surgical Technique: It is important to perform the fissurectomy athermally without the use of a monopolar electrocautery device. Also, a thermal haemostasis after resection is not performed. The

fissura is sharply excised with the scar tissue using a Parks anal retractor. After removal of the retractor, the wound is closed using Monocryl 4-0 running stitches.

Results/Outcome(s): We have used the technique in 18 patients so far. Primary wound healing was achieved in 14 patients, in 4 patients the suture had to be opened due to a painful hematoma, and wound healing was secondary but successful in all patients.

Conclusions/Discussion: Athermal fissurectomy with primary wound closure should be considered as a treatment option in selected patients.



LAPAROSCOPICALLY ASSISTED ENDOSCOPIC POLYPECTOMY - IS THE EFFORT JUSTIFIED?

P218

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Purpose/Background: To demonstrate the efficacy of laparoscopically assisted endoscopic polypectomy

Methods/Interventions: We performed a retrospective analysis of prospectively collected data. Patients in whom endoscopically removal of a polyp could not be performed safely and in whom histological examination of retrieved tissue specimen did not prove a carcinoma were offered endoscopic polypectomy under laparoscopic control under inpatient conditions. All patients had a complete colonoscopy. Laparoscopically assisted endoscopic polypectomy (LAEP) was performed in general anesthesia and in lithotomy position as CO₂ colonoscopy. The study objective was the success rate of LAEP in technical (complications) and clinical terms (exclusion of a carcinoma in the definitive histology and avoidance of a follow-up operation). The polyps were in part removed in piece-meal technique, so a statement on the R-status is not possible.

Results/Outcome(s): Between December 2012 and October 2018, laparoscopically assisted endoscopic polypectomy was planned in 24 patients. In 2 patients, the polypectomy could not be performed for technical reasons and a laparoscopic segmental colon resection was performed. In each patient, exactly 1 polyp was removed during the

operation. The median age of the patients was 64 years (± 14); 15 were male, 7 female. 17/22 polyps (77.3%) were in the cecum or ascending colon. The median duration of surgery (incision-suture time) was 87 (55-96) minutes. The median polyp size was 27 (12-36) mm. The mean length of stay after successful polypectomy was 2.5 (2-4) days. In one patient a carcinoma was detected in the definitive histology, so that an oncological hemicolectomy had to be performed. Complications: There were no intraoperative complications. In one patient, postoperative bleeding occurred on the 1st postoperative day, which could be stopped in a re-colonoscopy with clip application.

Conclusions/Discussion: We successfully completed the polypectomy in 20/24 patients (87.5%) without complications. Only in one case a carcinoma was detected in the definitive histology. Postoperative bleeding was the only postoperative complication and could be stopped by re-colonoscopy. The increased expenditure of LAEP should be balanced with the benefit to the patient. In our experience this is justified in most cases. Due to the often performed ablation in piece-meal technique a short-term control colonoscopy is indispensable.

FILAC VIA FISTULOSCOPE A NEW WAY FOR COMPLEX ANAL FISTULA WITH DEEP TRACKS.

P219

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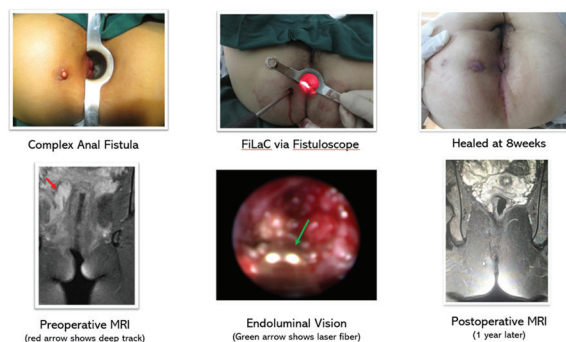
Purpose/Background: The surgical treatment of complex anal fistula is very challenging because of the incidence of recurrence and incontinence after various traditional approaches. Accurate location and correct treatment of the primary opening is crucial for success. But in some complex cases, the persistent deep fistula track is the major reason for surgical failure because it is difficult to identify and deal. Video-assisted anal fistula treatment and energy delivery devices are the novel sphincter-saving techniques, but there has no report of using these two techniques at the same time. In this pilot study we reviewed the outcomes of FiLaC via fistuloscope in regarding to success rate, healing time and complications for complex anal fistula with deep tracks.

Methods/Interventions: Outcomes of all patients who had undergone FiLaC via fistuloscope since October 2017 until October 2018 were retrospectively reviewed. Outcomes of interest were healing time (defined as epithelization of the wounds with resolution of symptoms and MR imaging), postoperative complications (infection, bleeding and incontinence) and failure (defined as persistence of fistula beyond 3 months post operatively). **Operative technique:** We used fistuloscope (Karl Storz, Germany) which can identify the deep fistula track with visualizing first. Then we inserted the FiLaC fiber (Biomedical technology, Germany) into the fistuloscope which capable of emitting 14watt laser energy with a wave length of 1470nm. The

fiber has a 360° radial emission which ensures homogenous photothermal destruction of the deep fistula tract. The laser fiber was passed through the fistuloscope with the tip exposed and was withdrawn slowly step by step at a speed of 1mm/sec. If the primary opening was identified, then closed full thickness using 2/0 Vicryl suture.

Results/Outcome(s): In this study 9 patients with cryptoglandular complex anal fistula with deep tracks were included. Patients age ranging between 22years and 47years and Male to Female ratio was 7:2. The average number of previous operations was 2.14. All patients were diagnosed with high complex fistula by preoperative MR imaging. The mean follow-up period was 28weeks, ranging from 10weeks to 57weeks. Primary healing was achieved in 8/9 patients (88.9%) with mean healing time 5.8weeks. One patient had persistence of symptoms beyond 3 months postoperatively. No intraoperative complications were reported in this study and no patient reported postoperative continence problem.

Conclusions/Discussion: Treat the deep track accurately and sufficiently is crucial for complex anal fistula. We performed this new procedure using laser energy fiber to cauterize and contract deep fistula track entirely under direct endoluminal vision which are the main features of the VAAFT and FiLaC techniques. We find the FiLaC via fistuloscope technique is minimally invasive and safe with high success in treatment of complex fistula with deep tracks.



OPERATIVE INCISION AND DRAINAGE FOR PERIRECTAL AND PERIANAL ABSCESES: WHAT ARE RISK FACTORS FOR PROLONGED LENGTH OF STAY, REOPERATION, AND READMISSION?

P220

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Purpose/Background: Anorectal abscesses are a common problem for surgeons in a variety of clinical settings. The high prevalence of this disease underscores the need for a better understanding of current outcomes in the management of this problem. Our study aims were to evaluate the outcomes following operative incision and drainage (I&D) for anorectal abscesses and to examine

factors associated with prolonged length of stay (LOS), unintended readmissions and reoperations.

Methods/Interventions: The American College of Surgeons National Surgical Quality Improvement Program (NSQIP) participant-use files (PUFs) from 2011 through 2016 were analyzed to identify patients with a diagnosis of perirectal and perianal abscess who underwent surgical I&D. All I&D cases examined were performed in the operating room, as the NSQIP PUFs do not capture bedside procedures. Only procedures coded as “outpatient” status (a standard variable collected by NSQIP) were included. The outpatient status is determined by the institution’s surgical case reviewer based on the surgical booking. Patients who also carried a diagnosis codes for necrotizing fasciitis or hidradenitis or a procedure codes for any anal fistula procedure, endoscopy, laparoscopy, or I&D of another body area were excluded. Relevant patient and clinical characteristics (i.e age, BMI, preoperative sepsis, medical comorbidities... etc) were obtained from the NSQIP PUFs. The study outcomes included postoperative LOS \geq 1 day and reoperation and hospital readmission within 30 days from the initial I&D procedure. Patient and clinical characteristics were analyzed on univariate analysis using the Chi square test. Variables associated with study outcomes at the $p\leq 0.1$ level on univariate analysis were evaluated with multivariable logistic regression using a forward selection process.

Results/Outcome(s): We identified 2,358 patients who underwent I&D for the diagnosis of perirectal and perianal abscess during our time period. Patients were mostly male (68.8%) with an average age of 46.1 years (standard deviation 15). Common comorbidities included diabetes (13.1%), use of steroids or immunosuppression (5.7%), and bleeding disorders (2%). Preoperative sepsis, based on strict clinical and lab criteria defined by NSQIP, was present in 16.5% of patients and 39.5% had leukocytosis. There was no postoperative mortality. Of all the patients, 37.3% (881 of 2358) were either admitted to the hospital

for ≥ 1 day, readmitted after discharge home or underwent reoperation. Approximately 35% of all patients (822 of 2358) spent ≥ 1 days in the hospital after surgery and the median length of stay (LOS) for these patients was 1 day (75% of these patients had postoperative LOS = 1). The need for hospital stay (LOS ≥ 1 day) was associated with African American race, Hispanic race, preoperative SIRS, preoperative sepsis, and bleeding disorder in a multivariate analysis (Table 1). Reoperation was documented in 3.7% of patients (74 of 2024 patients) with a median time to reoperation of 15.5 days (IQR 7-21 days). Morbid obesity (BMI >35) and dependent functional status were significantly associated with reoperations in a multivariate analysis (Table 1). The majority of reoperations (79.7%) were performed for additional I&D of undrained abscesses. Unintended readmissions were found in 3.0% (70 of 2349 patients) with a median time to readmission of 10.5 days (IQR 4-22). Female sex, preoperative steroid or immunosuppression use, and dependent functional status were significantly associated with readmissions in a multivariate analysis (Table 1). Common indications for readmission after I&D included recurrent/persistent anorectal abscess (41.4%), and fever/sepsis (8.6%).

Conclusions/Discussion: In the United States, the need for hospital stay, reoperations, or readmissions following operative I&D for outpatient anorectal abscesses is not uncommon. High risk features include non-White race, morbid obesity, immunosuppression, and dependent status. Additionally, inadequate drainage at the initial I&D, a potentially avoidable error, comprises the majority of indications for both reoperations and readmissions. The current study is limited by the lack of relevant clinical variables (e.g. size and extent of abscesses, availability of preoperative imaging, and interval from symptom to diagnosis/treatment). In the era of value-based care, further work is needed to optimize utilization outcomes for high-risk patients undergoing anorectal I&D.

P220 Table 1: Patient factors associated with hospital stay (LOS \geq 1 day), reoperations and readmissions following operative I&D

Patient factor	LOS >1 days	Reoperation	Readmissions
	Multivariable odds ratio (95% CI) (N=2358)	Multivariable odds ratio (95% CI) (N=2017)	Multivariable odds ratio (95% CI) (N=2349)
Female	-	-	2.02 (1.24-3.3)
Morbid Obesity (BMI >35)	-	1.72 (1.03-2.87)	-
White	Ref	-	-
African American	1.94 (1.5-2.44)	-	-
Hispanic	2.26 (1.69-3.02)	-	-
Preop SIRS	2.92 (2.0-4.25)	-	-
Preop Sepsis	3.91 (3.1-4.9)	-	-
Steroid or immunosuppression use	-	-	2.49 (1.18-5.23)
Bleeding disorder	2.22 (1.21-4.06)	-	-
Dependent functional status	-	3.74 (1.27-11)	5.98 (2.35-15.2)

THERMOGRAPHIC MAPPING IS A FEASIBLE METHOD TO MONITOR THE PERISTOMAL SKIN CONDITION OF STOMA PATIENTS.

P221

R. Fearn

London, United Kingdom

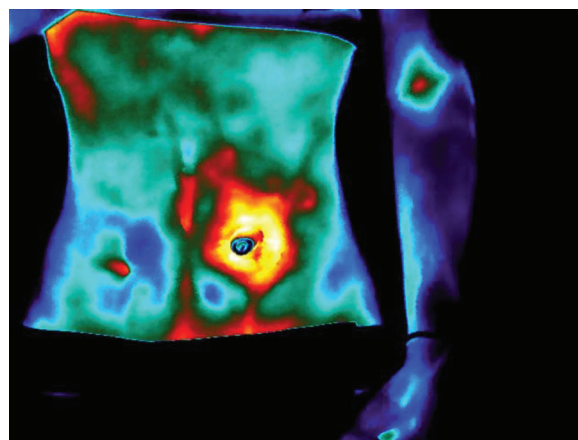
Purpose/Background: Both ileostomies and colostomies are associated with complications that can have a large impact on quality of life, such as leakage from the stoma appliance, which occurs in 68% of patients, and peristomal skin complications, which occur in 41% of patients (1). Skin complications account for more than one in three visits to stoma nurses (2). Existing tools to track stoma-related issues require training and suffer from limited intra and inter-observer reliability (2). Skin surface temperature has been reported as a potential biomarker of skin and soft tissue infection with significant differences in temperature detected in affected areas (3). Thermal imaging has proposed as a biomarker for IBD and colorectal cancer (4). Such techniques have also been used to map the abdomen of patients after enterostoma in the early postoperative period where infected wounds had distinct thermal patterns (5). We aimed to assess the feasibility of this application of thermal imaging in the ongoing monitoring of peristomal skin.

Methods/Interventions: Patients with an existing stoma were invited to participate in testing. Demographic data and information relating to their underlying medical condition was recorded and the abdominal wall and peristomal skin region were inspected under controlled ambient conditions in a private hygienic area. Core body temperature was recorded (Tempa.DOT™ Single Use Clinical Thermometer, Medical Indicators, Inc.) and thermal and optical images were acquired using a pre-calibrated thermal camera (FLIR E60) as per the manufacturer's instructions. Skin condition was assessed from the optical image by trained researchers and categorized into cases with or without skin issues. These images were compared with the thermal image to assess for correlation. Areas of interest were identified by their relative clock-face position. Ethical approval was obtained from Western IRB.

Results/Outcome(s): Thirty three peristomal thermographs were collected from 30 patients in Southern California between September 2017 and October 2018. Three patients attended twice. Median age 45 (21-88). Eighteen (60%) were ileostomy patients, 9 colostomy (30%) and 3 urostomy (10%). Median time since surgery was 5 years (3 months-74 years). All patients were afebrile and ambient temperature was comparable throughout. Twenty-four cases (73%) were assessed to have one or more skin complication. Of these erythema (71%), and tissue overgrowth (50%) were the most common followed by discoloration (17%), scar tissue (13%), mucocutaneous separation (13%) and erosions (8%). Skin issues correlated with clearly identifiable regions of temperature difference in 23 (96%) of the patients identified from optical

assessment. Of the 9 patients without skin issues, 6 (67%) had corresponding thermal imaging with no regions of identifiable temperature difference. The remaining 3 cases had skin that was normal to visual inspection, but areas of increased temperature of uncertain significance. The mean difference in temperature between an area of skin complication and normal skin was 1.61°C (SD 0.68°C).

Conclusions/Discussion: In this series of 33 peristomal thermographs, skin complaints were identified with 93% sensitivity, suggesting that thermal mapping is a promising objective method to assess and monitor peristomal skin complaints. The number of false positives was small (33% of those with no visible peristomal skin issues). Areas of increased skin temperature indicated regions may plausibly be an early sign of developing skin irritation. With miniaturization of technology it is now possible to monitor skin surface temperature continuously and remotely. Further studies are required to assess for the variability of thermal signals within and between individuals, however this data suggests this is a feasible and valid method to measure changes in skin condition. 1. Phatak UR, Li LT, Karanjawala B, Chang GJ, Kao LS. Systematic review of educational interventions for ostomates. *Dis Colon Rectum*. 2014;57(4):529-37. 2. Martins L, Ayello EA, Claessens I, Steen Hansen A, Hentze Poulsen L, Sibbald RG, et al. The ostomy skin tool: tracking peristomal skin changes. *Br J Nurs*. 2010;19(15):960, 32-4. 3. Montalto M, Davies F, Marijanovic N, Meads A. Skin surface temperature: a possible new outcome measure for skin and soft tissue infection. *Aust Fam Physician*. 2013;42(9):653-7. 4. Banic M. Thermography in patients with inflammatory bowel disease and colorectal cancer: evidence and review of the method. *PERIODICUM BIOLOGORUM*. 2011;113(4):439-44. 5. Siah CJ, Childs C. Thermographic mapping of the abdomen in healthy subjects and patients after enterostoma. *J Wound Care*. 2015;24(3):112; 4-20. 6. Webb RC, Pielak RM, Bastien P, Ayers J, Niittynen J, Kurniawan J, et al. Thermal transport characteristics of human skin measured in vivo using ultrathin conformal arrays of thermal sensors and actuators. *PLoS One*. 2015;10(2):e0118131.



Thermal imaging correlates with areas of skin irritation in 93% of cases.

PROGNOSIS AFTER RADICAL SURGERY FOR HIGH INTERSPHINCTERIC FISTULA-IN-ANO: A RETROSPECTIVE STUDY TO HIGHLIGHT THE IMPORTANCE OF THE CONJOINED LONGITUDINAL MUSCLE DETECTED BY ENDOANAL ULTRASOUND.

P222

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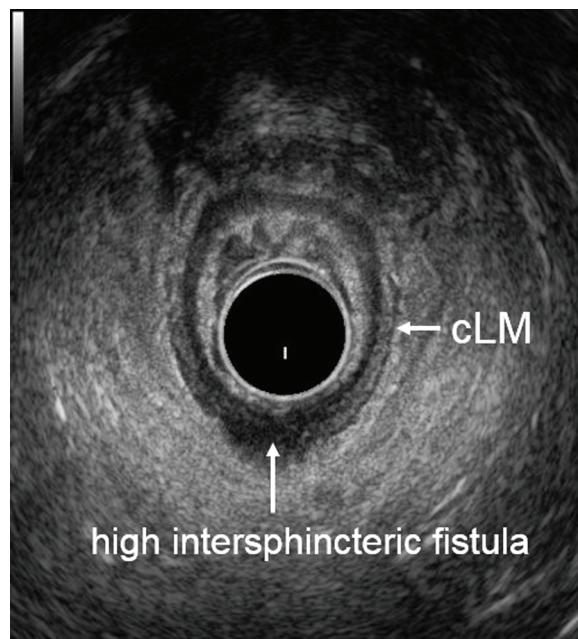
Purpose/Background: In case of Parks' high intersphincteric abscess, incision and drainage through the external anal sphincter may induce an iatrogenic complex anal fistula formation. One of the reasons for this complication is that the conjoined longitudinal muscle (cLM) which exists between the internal and external anal sphincter prevents and/or blocks an abscess that forms in the high intersphincteric space from extending externally into the ischioanal space (Figure 1). Therefore, in this type of abscess, incision and drainage should be done via the transanal approach through intersphincteric groove or through rectal mucosa. And as for radical surgery in the fistula stage, a potential procedure for this type of fistula is laying open the mucosa and internal anal sphincter muscle via the transanal approach. The aim of this study was to determine the efficacy of our radical procedure.

Methods/Interventions: Consecutive patients (n=67) with high intersphincteric fistula-in-ano who underwent surgical treatment between March 2014 and January 2016 were enrolled in this retrospective study. Cases with Crohn's disease and ulcerative colitis were excluded. Endoanal ultrasound was performed on all anal fistula cases and high intersphincteric fistula was identified if the primary focus existed between the internal anal sphincter and cLM and if it was also above the dentate line. The surgical procedure was as follows: a primary opening was opened from the dentate line to the anal verge skin, and then about 5mm of the proximal fistula tract from the dentate line was opened to get adequate drainage from the further proximal tract.

Results/Outcome(s): All of the 67 patients enrolled in this study had high intersphincteric fistula-in-ano. The median follow-up period was 68 days (range 19-709 days). Fifty-eight percent of the fistula cases extended to as high as the puborectal muscle. A comparison of the preoperative and postoperative maximum resting pressure (MRP) and maximum squeeze pressure (MSP) was possible in 10 of the 67 cases. No significant difference was found in MRP (preoperative mean 116 ± 18 ; postoperative $101 \pm 22 \text{ cmH}_2\text{O}$) and in MSP (preoperative mean 374 ± 147 ; postoperative $352 \pm 138 \text{ cmH}_2\text{O}$). The preoperative and postoperative Wexner's incontinence score was 0 in 9 of the 10 cases, and in one of the cases the preoperative score was 0 and the postoperative score was 3 but the postoperative MRP was 128 and the MSP was 196 cmH_2O (WNL).

None of the patients experienced reoperation for recurrence and there was no significant postoperative bleeding.

Conclusions/Discussion: Endoanal ultrasound is superior to other modalities in identifying cLM. Moreover, it is important to understand the positional relationship between the primary focus of anal fistula and cLM to determine whether to operate through the external anal sphincter or via the transanal approach. The procedure performed in this study had a good success rate and did not significantly damage the external sphincter muscle thus preserving anal function.



TREATMENT COMPLETION AND DELAY IN STAGE II AND III RECTAL CANCER: A POPULATION BASED STUDY IN APPALACHIAN KENTUCKY AND THE EFFECT ON SURVIVAL.

P223

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Purpose/Background: Appalachian Kentucky (AK) has one of the highest mortality rates in rectal adenocarcinoma (RAC) in the US. Concurrently, AK has the highest poverty rate at 1.7 times the national average, leading to low insurance coverage and poor access to care. The treatment of stage II/III RAC utilizes a multimodal regimen requiring patients to have regular access to expert care. Poor access has been associated with delays and incomplete treatment in cancer care. Standardized RAC treatment has been demonstrated to improve survival, while the impact of treatment delays on prognosis is unclear. The purpose of this study is to evaluate the impact of non-standardized and delayed treatment for stage II/III RAC as a potential explanation for poor RAC survival in AK.

Methods/Interventions: A retrospective review of patients diagnosed with stage II/III rectal adenocarcinoma (RAC) from 2005-2015 was performed through the Kentucky Cancer Registry. AK and non-AK designation was based on county of residence. Patients were separated into two treatment groups: standardized (treatment according to the National Comprehensive Cancer Network [NCCN] guidelines) and non-standardized (other combination of surgery/chemoradiation/chemotherapy, surgery only or no treatment). Treatment delay was evaluated in the standardized treatment group and defined as delay greater than 60 days (according to the Commission on Cancer quality measure for RAC) from the date of diagnosis to the date of neoadjuvant treatment. Fisher's exact test, logistic, Cox regression and Kaplan Meier analysis were performed.

Results/Outcome(s): A total of 1896 patients met the inclusion criteria. Of these, only 887 (46.8%) had standardized treatment according to the NCCN guidelines, while 1009 (53.2%) had non-standardized treatment. Similar proportion of AK (47.5%) and non-AK (45.2%) patients received guideline treatment. Factors associated with standardized treatment include male gender ($p = 0.0002$), stage III disease ($p = 0.0277$), larger tumor size ($p = 0.0062$), private insurance ($p < 0.0001$), and higher rates of high school education ($p = 0.0089$). Factors associated with non-standardized treatment include higher tumor grade ($p = 0.0006$), Medicare insurance ($p < 0.0001$), and higher poverty level ($p = 0.0177$). Interestingly, AK status was not significantly associated with non-standardized treatment ($p = 0.3727$). However, survival analysis demonstrated a significant survival difference between AK and non-AK patients ($p = 0.0342$, **Figure 1A**) and between standardized and non-standardized treatment groups ($p < 0.0001$, **Figure 1B**). The worst survival was in the non-standardized AK population and the best survival was in the standardized non-AK population ($p < 0.0001$, **Figure 1C**). When evaluating patients who had standardized treatment, 35 (5.5%) of non-AK and 29 (11.4%) of AK patients had treatment delay. Factors associated with treatment delay include AK status ($p = 0.0024$) and higher poverty level ($p = 0.0182$). Finally, treatment delay did not have survival differences in both the AK and non-AK population ($p = 0.6989$, **Figure 1D**).

Conclusions/Discussion: Our study evaluated the factors behind high rates of RAC mortality in AK. We identified similar rates of non-standardized treatment in both the AK and non-AK groups. However, non-standardized AK patients had worse survival. The incidence of treatment delay was low and did not contribute to worse AK survival. Further studies are needed beyond treatment completion and delay as potential explanations of higher AK RAC mortality.

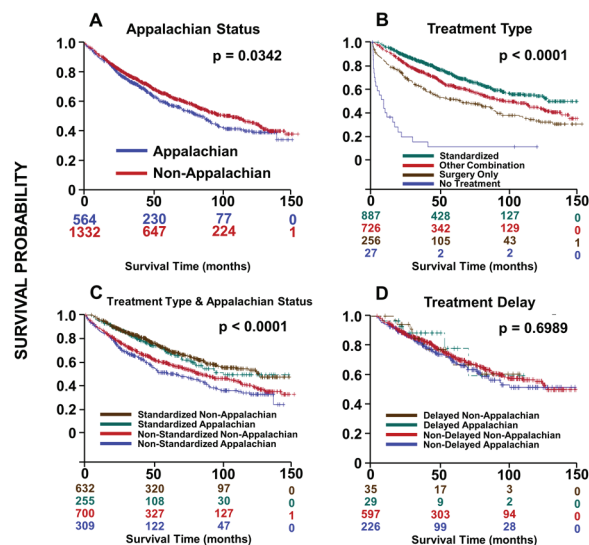


Figure 1. Overall Survival for Stage II/III Rectal Adenocarcinoma by the State of Kentucky. A) Kaplan Meier (KM) curve of overall survival by Appalachian status only. B) KM curve of overall survival by treatment types, including standardized (according to NCCN guidelines) and non-standardized (Other combination of chemoradiation/surgery/chemotherapy, surgery only, and no treatment). C) KM curve of overall survival by treatment type and Appalachian status. D) KM curve of overall survival in all standardized treatment separated by delay > 60 days and Appalachian status.

IMPLEMENTATION OF ERAS PROTOCOL IN COLORECTAL SURGERY AT THE RANCAGUA REGIONAL HOSPITAL: PRELIMINARY RESULTS.

P224

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Purpose/Background: Patients who undergo colorectal surgery procedures tend to need prolonged hospital stays and long fasting periods. These negative consequences can create postoperative complications. The ERAS protocol (Enhanced Recovery After Surgery) is a set of multidisciplinary procedures which aim to standardize post operative care with the purpose of optimizing the results. The aim of this study is to analyze the preliminary results of postoperative complications in patients since the implementation of the ERAS protocol applied since January 2018 by the Colorectal Surgery Unit at Rancagua Regional Hospital. In order to analyze the effectiveness of the taken actions, this study compares patients' complications before and after the implementation of the new ERAS protocol, without changing the surgical team.

Methods/Interventions: The implementation of the ERAS protocol for resection colorectal surgery was analyzed through a retrospective, analytical and descriptive cohort study, considering preoperative recruitment based on inclusion and exclusion criteria described in the literature. The primary outcome was length of hospital stay measured in days. Secondary outcome variables were postoperative

complications, reoperations and mortality rates. The results of both variables were compared to numbers of the historical cohort (control group) of the Colorectal Surgery Team.

Results/Outcome(s): Ten patients undergoing the ERAS protocol were selected and compared to 10 patients from the historical cohort. Both groups showed similar distribution in demographic variables and similar procedures like colectomies, caused primarily by colorectal cancer. The approach was laparoscopic in 70% in the ERAS group and 40% in the control group. The mean length of hospital stay was 4.4 ± 0.69 days in the ERAS group and 6.1 ± 0.56 days in the control group ($p < 0.0001$). One complication Clavien-Dindo I was found per group. In the ERAS group one case of infection at the surgical site and a controlled surgical wound hematoma were reported. No reinterventions were reported. The follow-up showed no readmissions and mortality in both groups.

Conclusions/Discussion: Considering an acceptable statistical significance level, the implementation of the ERAS protocol has reduced hospitalization days in its preliminary stage by 1.7 days. A higher number of patients is need in order to show the real benefit of this intervention.

COMPARISON OF SHORT-TERM OUTCOMES OF INCISIONLESS AND SMALL INVASION LAPAROSCOPIC SURGERY IN THE TREATMENT OF RECTAL CANCER.

P225

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Purpose/Background: To compare the short-term outcomes of the incisionless and small invasion laparoscopic surgery in the treatment of rectal cancer.

Methods/Interventions: The clinical data of 252 cases of rectal or sigmoid colon cancer operated in department of gastrointestinal surgery, affiliated Shanghai east hospital of Tongji university from 2016 June to 2017 June were retrospectively analyzed, in which 101 cases were underwent incisionless surgery and 151 cases were underwent small invasion surgery. The short-term outcomes such as operation time, amount of bleeding, hospitalization length, interval to first flatus, interval to first oral intake, postoperative lymph node number, tumor resection margin length, postoperative complication rate and 1 year disease free rate (DFS) were analyzed among the three groups.

Results/Outcome(s): There were no significance difference in operation time, amount of bleeding, postoperative lymph node number and tumor resection margin length and postoperative complication rate between two groups. The hospitalization length were (8.7 ± 2.2) d and (9.9 ± 1.8) d, ($P < 0.01$). The interval to first oral intake were (16.0 ± 6.0) h and (24.7 ± 6.5) h, ($P < 0.01$). The interval to first oral intake were (47.1 ± 6.1) h and (56.4 ± 6.6) h, the difference was significant ($P < 0.01$).

Conclusions/Discussion: Incisionless surgery is safe and viable compared to small invasion surgery, which may shorten the recover time.

TOTALLY LAPAROSCOPIC EXTENDED SIGMOID COLON RESECTION WITH TRANSVAGINAL SPECIMEN EXTRACTION.

P226

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Purpose/Background: This video presents an operation that Totally laparoscopic extended sigmoid colon resection with transvaginal specimen extraction.

Methods/Interventions: A 5-port technique is employed. The tumor is located in sigmoid colon with bladder and uterus invaded. With a middle approach, the medial side of the sigmoid mesocolon was dissected for exposure of Toldt's space. Then the inferior mesenteric artery was clipped and cut off. Rectum was dissection. The bladder invaded by tumor were incised. The uterine ligaments and the uterine artery were dissected. Trigone of bladder were exposed. After mobilization, distal rectum were divided using Endo-GIA. A protective sleeve were inserted to abdominal cavity and pulled out transvaginal. The anvil head of the circular stapling were inserted from the vagina, and the specimens were extraction. The bladder was sutured, and the uterus was sutured. The pelvic floor was sutured with intestinal mesentery. At last, rectum were reconstructed by circular stapling.

Results/Outcome(s): The operation time was 190min, and the bleeding amount was 200ml. The interval to first oral intake was 48h, and the postoperative hospitalization length was 11d.

Conclusions/Discussion: Totally laparoscopic extended sigmoid colon resection with transvaginal specimen extraction is feasible and safe.

COMPLETE MESOCOLIC EXCISION VS CONVENTIONAL COLECTOMY FOR RIGHT COLON CANCER.

P227

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Purpose/Background: Complete mesocolic excision (CME) is a standardized approach to radical colectomy comprising of resection within an intact mesocolic envelop, ligation of draining vascular pedicles at their origin and resection of at least 10cm of bowel at each end. This technique could offer better oncological outcomes but has shown to be associated with higher morbidity in a recent metaanalysis.

Methods/Interventions: This is a retrospective review of a prospectively maintained database, at a single tertiary referral cancer centre in India. All patients undergoing elective right colectomy for biopsy proven, non-metastatic, primary, adenocarcinoma from Nov 2013 to Oct 2018 were included. During this period, CME was adopted selectively and documented prospectively. These patients were included in the CME group and compared with the remaining patients undergoing conventional colon resection during the same time period (NCME group). T4b lesions requiring multivisceral resection were excluded. Right extended hemicolectomy for splenic flexure lesions were also excluded. Anastomotic leak was defined as extravasation of contrast on cross-sectional imaging or peri-anastomotic collection requiring intervention.

Results/Outcome(s): 244 patients (CME n=88; NCME n=156) met the inclusion criteria and were included in the analysis. Both groups were comparable with respect to age, sex, ASA grade, site of colon primary, type of surgical resection (i.e. Right Vs Right extended coelctomy) and Body Mass Index (BMI) (Table 1). 35.2% and 8.9% underwent a laparoscopic resection in the CME and NCME group respectively

($p < 0.001$) with an overall conversion rate of 4.4%. Post-operative complications, anastomotic leak rates, hospital stay, 90-day mortality and pathological T and N stage were similar between the groups. CME was associated with a significantly lower blood loss ($p = 0.005$) and higher nodal yield ($p = 0.003$). The measured length of resected bowel was similar in both groups (CME 34.4cm; NCME 35.5cm; $p = 0.374$) There were 3 deaths in this series one in the CME group (anastomotic leak and sepsis) and 2 in the NCME group (post-op myocardial infarction; anastomotic leak and sepsis). 58% and 52.6% received adjuvant chemotherapy in the CME and NCME groups respectively ($p = 0.79$). With a median follow up of 20.8 months, there was no difference in the 3-yr Overall Survival (OS) between the groups. Though not statistically significant, disease free survival (DFS) was slightly higher in the CME group (Table 1).

Conclusions/Discussion: When compared to conventional colectomy, CME yields a higher lymph node count, is amenable to the laparoscopic approach and is not associated with increased morbidity or mortality. Longer follow up could reveal a higher disease free survival with this technique.

P227 Table 1: CME Vs Conventional Colectomy

Parameter	CME (n=88)	Non-CME (n=156)	p
Age (mean, yrs)	52.08	50.59	0.38 ^a
Sex male	55 (62.5)	106 (67.9)	0.40 ^b
ASA 1	46 (52.3)	85 (54.5)	0.75 ^b
ASA 2	39 (44.3)	68 (43.6)	
ASA 3	3 (3.4)	3 (1.9)	
Site - Caecum	27 (30.7)	50 (32.0)	0.83 ^b
Ascending colon	34 (38.6)	59 (37.8)	
Transverse colon	7 (8.0)	17 (11.0)	
Hepatic Flexure	20 (22.7)	30 (19.2)	
Laparoscopic resection	31 (35.2)	14 (8.9)	0.001 ^b
Sx Type -Rt Hemicolectomy	63 (71.6)	124 (79.5)	0.21 ^b
Rt Extended Hemicolectomy	25 (28.4)	32 (20.5)	
BMI (mean, Kg/m ²)	22.97	22.53	0.46 ^a
Blood Loss (mean, ml)	218.6	295.0	0.005 ^a
Anastomotic leak	7 (7.9)	11 (7.1)	0.80 ^b
Clavien-dindo -Grade 0-IIIa	81 (92)	141 (90.4)	0.82 ^b
Grade IIIb – V	7 (8)	15 (9.6)	
Hospital stay (mean, days)	7.41	7.56	0.82 ^a
pT Stage - T2	10 (11.4)	24 (15.4)	0.12 ^b
T3	58 (65.9)	112 (71.8)	
T4a	20 (22.7)	20 (12.8)	
pN Stage - N0	51	102	0.45 ^b
N1	22	35	
N2	15	19	
Total Nodes (mean)	32.73	27.35	0.003 ^a
90-day Mortality	1.13%	1.28%	0.921 ^b
3-yr OS	93.6%	95.7%	0.56 ^c
3-yr DFS	85.3%	80.2%	0.15 ^c

a – Student's t test; b – Chi-Square test; c- Kaplan Meier method;

Numbers in parenthesis indicate percentage

PATHOLOGICAL ANALYSIS OF THE SURGICAL SPECIMENS IN EMERGENCY COLECTOMIES FOR COLORECTAL CANCER PERFORMED AT THE RANCAGUA REGIONAL HOSPITAL (RRH) DURING THE PERIOD 2016-2018.

P228

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Purpose/Background: There is consensus that the only curative therapy in colorectal cancer (CRC) is surgery. Up to 50% of CRC presents with obstruction and / or intestinal perforation at diagnosis. An optimal resective technique remains the cornerstone in the prognosis of the disease. The aim of this study is analyze the pathological results of surgical specimens obtained in emergency colectomies by CRC carried out by general surgeons and compare them with elective colectomies from the same period performed by the Colorectal Surgery team.

Methods/Interventions: This article describes a retrospective, analytical and descriptive study. We reviewed histopathological reports of patients undergoing emergency surgery performed by General Surgeons and elective surgery by the Colorectal Surgery Team from January 2016 to June 2018 in RRH. Demographic, clinical and histopathological variables were analyzed. Primary outcome: number of resected lymph nodes and surgical margins. Patients with rectal cancer and metastatic disease were excluded.

Results/Outcome(s): 75 patients were undergoing surgeries: among them 64.0% were operated as elective surgery and 36.0% in emergency room. The distribution of demographic variables and types of colectomies were similar between two groups. The average of resected lymph nodes in colectomies was 18.72 ± 0.99 : in elective $19,94 \pm 9,05$ and in emergencies $16,56 \pm 7,41$; ($p = 0.10$). Colectomies with lymph node count > 12 : 81.33% in the global group with 83.33% for elective surgery and 77.77% for emergency ($p = 0.55$). Negative margins were achieved in 81.33% of the global group; 89.58% in elective colectomies and 66,7% in the emergency setting. When combining both variables (nodal count > 12 and negative margins); it was achieved in 75% of elective colectomies and in 51.85% of emergency colectomies ($p = 0.07$).

Conclusions/Discussion: We find a not statistically significant difference between colectomies performed in the emergency setting and those in the elective for CCR in terms of surgical margins and resected lymph nodes. It is possible that with a higher total number of patients, the combined variable could have statistical significance.

CLINICOPATHOLOGIC ANALYSIS OF LATERAL MARGIN AND MESORECTAL SPREAD OF RECTAL CANCER WITH WHOLE-MOUNT SECTION.

P229

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Goyang, Korea (the Republic of)

Purpose/Background: Sufficient lateral margin (LM) and delicate total mesorectal excision (TME) is well known as a significant prognostic factor in rectal cancer. Whole-mount section can provide precise measurement of LM and presence of micrometastasis in mesorectum. Taking advantage of whole-mount section, the purpose of this study is to analyze clinicopathologic results according to LM and micrometastasis measured by whole-mount section.

Methods/Interventions: We analyzed medical records of 243 patients who were had surgery for rectal cancer from January 1st, 2005 to December 31th, 2015 and their specimens were examined with whole-mount section. LM was measured in 195 patients and we analyzed clinical data according to LM with 0.5mm intervals from 1mm to 2mm.

Results/Outcome(s): Patients with LM less than 1mm ($n=29$) had significantly more local recurrence and systemic recurrence than patients with LM more than 1mm ($n=166$) (Local recurrence 10.3% vs. 6.0%, Systemic recurrence 41.4% vs. 19.9%, $p=0.005$). Patients with LM ≤ 1.5 mm ($n=31$) had significantly more local and systemic recurrence than patients with LM > 1.5 mm ($n=164$) (Local recurrence 9.7% vs. 6.1%, Systemic recurrence 38.7% vs. 20.1%, $p=0.014$). There was no significant difference of local and systemic recurrence rate between LM ≤ 2 mm and LM < 2 mm ($p=0.127$). There were significant differences in disease specific survival (DFS) and overall survival (OS) between all groups. (5 year DFS: LM ≤ 1 mm 31.2% vs. > 1 mm 74.6%, $p < 0.001$; LM ≤ 1.5 mm 37.8% vs. > 1.5 mm 74.2%, $p < 0.001$; LM ≤ 2 mm 47.2% vs. > 2 mm 73.7%, $p=0.002$) (5 year OS: LM ≤ 1 mm 26.7% vs. > 1 mm 71.3%, $p < 0.001$; LM ≤ 1.5 mm 37.8% vs. > 1.5 mm 74.2%, $p < 0.001$; LM ≤ 2 mm 44.3% vs. > 2 mm 69.5%, $p=0.006$) Among 243 patients, 49 patients had micrometastasis in mesorectum (20.16%). Patients with micrometastasis ($n=49$) had significantly more advanced stage than patients without micrometastasis ($n=194$) (Stage 0: 0% vs. 4.1%; I: 0% vs. 24.7%; II: 12.2% vs. 32.5%; III: 59.2% vs. 30.4%; IV: 28.6% vs. 8.2%, $p < 0.001$). Patients with micrometastasis had significantly more lymphovascular invasion (83.3% vs. 50.8%, $p < 0.001$) and perineural invasion (64.6% vs. 30.7%, $p < 0.001$).

Conclusions/Discussion: Whole-mount section is important and meaningful to measure precise lateral resection margin and to explore mesorectum thoroughly. In our study, ensuring the LM at least 1.5mm is important to prevent recurrence. 49 patients (20.16%) had micrometastasis and showed advanced stage. For advanced patients, complete and delicate TME without injury of mesorectum is important not to leave micrometastasis.

THE ACCURACY OF MR TRG FOR PREDICTION OF TUMOR RESPONSE AND ONCOLOGIC OUTCOMES IN RECTAL CANCER AFTER PREOP.CRT: CORRELATION WITH PATHOLOGIC TRG.

P230

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Seoul, Korea (the Republic of)

Purpose/Background: Preoperative chemoradiotherapy (CRT) is a gold standard treatment for locally advanced rectal cancer, that can provide improved local control. The degree of tumor response to preoperative CRT varies, with 10-30% of patients experiencing a pathologically complete response. And It has been reported that patients with good response have a good prognosis. Therefore, there have been many efforts to evaluate tumor response prior to surgery by various methods such as mrTRG, DW-MRI, MR volumetry, and endoscopic mucosal abnormality, etc. Among them, mrTRG is widely used and is being used in the recent ongoing RCT, Trigger trial, as a marker to stratify treatment strategy according to tumor response. So this study aimed to assess the accuracy of mr TRG as prediction of tumor response and oncologic outcomes by correlation between mrTRG and pTRG in rectal cancer patients who had treated preop, CRT.

Methods/Interventions: A total of 669 patients (434male, 235female; median age, 59.0yr; range, 22-87yr) with rectal cancers who underwent preoperative CRT and had pre- and post-CCRT MRI and eventual curative surgery between January, 2011 and December, 2016 were retrospectively reviewed. All patients underwent preoperative radiation therapy, which consisted of a dose of 45 Gy in 25 fractions (1.8Gy for 5days) delivered to the pelvis followed by a boost of 5.4 Gy to the primary tumor over 5 weeks. The patients were treated with concurrent chemotherapy, intravenous injections of two cycles of 5-fluorouracil (400mg/m²/day) and leucovorin (20mg/m²/day) once a day for 5 days during the 1st and 5th weeks of radiation therapy or per oral capecitabine 825mg/m² twice per day. The mrTRG was assigned to one of five categories: a predominance of fibrosis with no (mrTRG1) or minimal (mrTRG2) residual intermediate tumor signal; substantial tumor SI present, but not predominating the fibrosis (mrTRG3); a predominance of tumor with minimal to low SI fibrosis (mrTRG4); and a tumor appearing unchanged from baseline (mrTRG5). The pathologic tumor regression grade was assessed according to the Mandard tumor regression grade. Sensitivity, specificity, positive predictive value and negative predictive value of mrTRG were calculated using a dichotomous classification for both mrTRG(mrTRG 1-2 vs mrTRG 3-5) and pTRG (pTRG 1-2 vs pTRG 3-5). The Kaplan–Meier method was used to estimate the survival outcome. Cox proportional hazards model was

used to analyze the effects of specified risk factors on DFS and OS. Software used was SPSS 23.

Results/Outcome(s): The mrTRG grade was as follows, Gr1 was 3.9%(n=26), Gr2 was 16.4%(n=110), Gr3 was 72.2%(n=483), Gr4 was 7.0%(n=47), and Gr5 was 0.5%(n=3). The pTRG (Mandard TRG) grade was as follows, Gr1 was 20.1%(n=130), Gr2 was 21.6%(n=140), Gr3 was 38.6%(n=250), G4 was 18.9%(n=122), and Gr5 was 0.8%. Accuracy of mrTRG grade were 45.8%(11/24) for Gr1, 25.7%(27/105) for Gr2, 40.3%(190/472) for Gr3, 27.7%(13/47) for G4 and 0%(0/3) for Gr5. Sensitivity, specificity, positive predictive value and negative predictive value of mrTRG 1–2 for the prediction of pTRG 1-2 was 30.3% (95% CI: 26.5-33.8), 87.8% (95% CI: 85.1-90.3), 64.3% (95% CI: 56.3-71.8) and 63.4% (95% CI: 61.4-65.2), respectively. And that of mrTRG for the prediction of pathologic complete response (pCR) was 39.0% (95% CI: 31.-41.6), 84.4% (95% CI: 82.6-86.2), 39.0% (95% CI: 31.9-46.1) and 84.4% (95% CI: 82.6-86.2), respectively. Disease free survival according to the mrTRG grades were 96.2% for Gr1 86.9% for Gr2, 72.6% for Gr3, and 68.8% for Gr49, respectively. (P=0.122). Overall survival according to the mrTRG grades were 100% for Gr1 91.1% for Gr2, 90.1% for Gr3, and 87.2% for Gr49, respectively. (P=0.549). In subgroup analysis comparing Gr1-2 with Gr3-5, there was a significant difference in DFS(5yr-DFS 82.9% vs 72.7%, respectively. P=0.032). But in overall survival, there is no significant difference between two groups (5yr-OS 92.9% vs 89.8%, respectively, P=0.980).

Conclusions/Discussion: The specificity of mrTRG to predict pathologic results is high but sensitivity is low. So, mrTRG alone is considered to be insufficient to assess tumor response. Because the criterion for grading is considered subjective, and It is necessary to develop other quantitative methods to evaluate tumor response more objectively to increase accuracy. Only subgroup analysis showed significant difference in DFS. Therefore, it may be practical to use mrTRG in subgroups to predict oncologic outcomes. Because of the low accuracy, it seems that tailoring treatment strategy based on mrTRG grade alone is not safe. However, sub-grouped mrTRG can predicting some extent of prognosis of the patients before surgery. It suggests that mrTRG may still be a useful tool as assessing tumor response in the tailoring treatment strategy, with improvements in its criteria, or with the aid of other quantitative diagnostic methods.

<Table 1> : Comparison between mrTRG and pT stage

	pT0(pCR)	pTis or pT1	pT2	pT3	pT4
mrTRG Gr 1	12	8	5	1	-
mrTRG Gr 2	41	19	30	20	-
mrTRG Gr 3	77	25	124	248	9
mrTRG Gr 4	6	6	33	2	-
mrTRG Gr 5	-	-	1	2	-

Accuracy of mrTRG Gr1-2 to predict pCR :
Sensitivity 39.0%, Specificity 84.4%, PPV 39.0%, NPV 84.4%

DIAGNOSTIC EFFICACY OF CYTOLOGY AND DNA GENOTYPING IN COMPARISON WITH HIGH RESOLUTION ANOSCOPY (HRA) IN HPV-RELATED ANAL DISEASES.

P231

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Purpose/Background: Therapeutic success in the treatment and prevention of HPV-related anal diseases highly depends on an appropriate diagnosis. The aim of this study is to investigate the reliability of the first line examinations (anal Pap-test for cytologic evaluation and anal DNA extraction for HPV genotyping) usually performed in the high-risk population and symptomatic patients. In this study, High Resolution Anoscopy (HRA) via Acetic Acid and Lugol dye visual inspection has been considered the reference diagnostic test.

Methods/Interventions: One hundred fifty-nine patients were enrolled in the study and the collection of the samples has been performed between January 2018 and October 2018. Patients were evaluated on the basis of risk factors (men-who-have-sex-with-men, HIV positive, transplant patients) and suggestive clinical presentation (external condylomas, non-disease-related anal itching). Anal cytology was performed on mucosal cells taken from the anal canal by brushing according to the PAP-test procedure. Mucosal cells were withdrawn from the anal canal by brushing were submitted to DNA extraction for HPV genotyping. HRA was performed using the Proctostation system (THD SpA, Correggio, Italy) and staining the anal canal mucosa and perianal skin with acetic acid and Lugol dye. Among the enrolled patients, 85 underwent both the anal Pap-test and HRA, 58 patients received both the HPV-DNA test and HRA, 58 patients were submitted to all three tests. Sensitivity and specificity have been calculated, as well as positive predictive values (PPV), and negative predictive values (NPV); The Cohen's Kappa coefficient was calculated to measure the agreement between either HPV-DNA test or PAP-test and HRA.

Results/Outcome(s): In comparison with HRA, HPV-DNA demonstrated a false positive result in 11 out of 58 (19%), and a false negative result in 6 out of 58 patients (10%), resulting in a sensitivity of 80%, specificity of 70%, PPV of 70%, and NPV of 70%. On the other hand, anal PAP-test revealed a false positive result in 18 out of 85 patients (21%), and a false negative result in 12 out of 85 patients (14%); consequently, sensitivity was 60% and specificity 60%, PPV 60%, and NPV 70%. The Cohen's agreement coefficient demonstrated a good concordance between HRA and HPV-DNA Test (0.70) and, slightly lesser, but still in the range, good concordance between HRA and Pap-test. However, when patients were submitted to both HPV-DNA and PAP-tests with a

concordance of results (i.e., both positive or both negative - 40 patients), the HRA-related data showed a sensitivity of 90%, specificity of 70%, PPV of 80%, NPV of 90%. Consequently, Cohen's agreement coefficient was excellent ($k=0.78$).

Conclusions/Discussion: This study has demonstrated that both anal HPV-DNA test and PAP-test, if performed as a single examination, has not a reliable diagnostic accuracy in the exclusion of HPV related anal diseases (sensitivity values were not very high) and identification of patients eligible to HRA (specificity values were not very high). On the other hand, the combination of HPV-DNA results with anal PAP-test data much better corresponded to the real HPV-related pathology as observed at the HRA examination (with high PPV, NPV, and excellent agreement coefficient).

ROLE AND BENEFIT OF LAPAROSCOPIC COLORECTAL RESECTION WITH OPEN LIVER RESECTION (HYBRID) IN TREATMENT OF COLORECTAL CANCER WITH SYNCHRONOUS LIVER METASTASES.

P232

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Purpose/Background: With improvement of surgical technique, simultaneous laparoscopic resection for colorectal cancer with liver metastases (MIS) has expanded border of its selection criteria, but still there are some limitations such as dependence to surgeon's skill, tumor size, location and relationship to major vessel. Combination of laparoscopic colorectal resection with open hepatectomy (Hybrid) could be applied to patients with similar characteristics compared to conventional open colorectal and liver resection (Open). Hybrid may have benefit of faster recovery without compromising long term outcome.

Methods/Interventions: From February 2006 to May 2017, 477 consecutive patients underwent curative resection for colorectal cancer with synchronous liver metastases at referral tertiary cancer center were identified. Short and long term outcomes among Open, Hybrid and MIS were compared.

Results/Outcome(s): There were no differences in preoperative-, colorectal cancer- and hepatic metastases characteristics between Open and Hybrid. MIS was associated with significantly lesser extent of hepatic metastases, compared to other two groups. Hybrid was associated with less severe postoperative day 3 pain (Open vs. Hybrid; $P=0.001$, Hybrid vs. MIS; $P>0.999$, MIS vs. Open; $P<0.001$) and faster bowel movement (Open vs. Hybrid; $P=0.016$, Hybrid vs. MIS; $P=0.034$, MIS vs. Open; $P<0.001$) and initiation of soft diet (Open vs. Hybrid; $P<0.001$,

Hybrid vs. MIS; $P=0.002$, MIS vs. Open; $P<0.001$) than Open method. Neither overall survival nor intra- and extra hepatic recurrences differed between Open and Hybrid.

Conclusions/Discussion: Laparoscopic colorectal resection with open hepatectomy showed earlier immediate postoperative recovery without compromising oncologic outcomes, compared to traditional open surgery. These short term outcomes were also comparable to the result of minimal invasive surgery. Hybrid technique could be an appropriate alternative to totally open- and laparoscopic surgery for patients with extensive hepatic metastases.

PREDICTIVE FACTORS AND CLINICAL OUTCOMES FOR NON-RESTORATIVE RECTAL CANCER SURGERY: A BINATIONAL REGISTRY STUDY.

P233

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Purpose/Background: Rectal cancer techniques and outcomes have improved over time due to a multidisciplinary model of care. APR rates remain high, and CRM rates variable as highlighted in various multicentre studies. Registry studies add value as they provide real world national data to help guide future policies. Our study aim was to assess the incidence of non-restorative resection and clinicopathological factors that determine restoration in low rectal cancers.

Methods/Interventions: A binational prospective Australasian clinical quality registry for colorectal cancer (Binational Colorectal Cancer Audit; BCCA) was investigated concerning low rectal cancer surgery between 2007 to 2017. Low rectal cancer was defined as at or below 6cm from the anal verge. A range of datapoints including baseline demographic, epidemiological, and clinicopathological factors were assessed between patients who underwent ultralow anterior resection (ULAR) with anastomosis and those who underwent APR. Univariate analysis was used to determine which of these factors were predictive of APR.

Results/Outcome(s): Between 2007 and 2017, 3628 patients were identified from the BCCA database with rectal cancer. Of those, 2096 were considered low. Abdominoperineal resection (APR) was performed in 1224 cases, with the remainder undergoing restorative procedures. Overall APR rate for rectal cancer was 34%. From 2007 to 2017 the proportion of APR remained constant at around 58% of all surgical procedures for low rectal cancer. The propensity of performing APR or ULAR was similar between urban and rural centres, however the majority (85%) of APR operations are being performed in urban hospitals. Non-restoration was more likely in the public health setting (62% vs 52%, $p<0.001$). More APR cases also received neoadjuvant chemoradiation treatment (68% vs. 60%, $p<0.001$). Of pathological factors, tumor height was the greatest predictor of non-restoration. Sixty five percent of APR's were performed for tumors at 3cm or less from the anal verge. ULAR was performed in 72% of tumors between 4 to 6cm from the anal verge. T stage was the second strongest predictor. Seventy two percent

P232 Immediate postoperative outcome

	Open (n=351)	Hybrid (n=55)	MIS (n=71)	P
Mortality rate, n (%)	2 (0.6)	0 (0.0)	1 (1.4)	.589
Clavien-Dindo grade ≥ 3 , n (%)	51 (14.5)	8 (14.5)	5 (7.0)	.232
Surgical site infection*, n (%)	5 (1.4)	1 (1.8)	1 (1.4)	.974
Anastomosis leakage*, n (%)	12 (3.4)	3 (5.5)	2 (2.8)	.702
Pulmonary*†, n (%)	17 (4.8)	2 (3.6)	2 (2.9)	.735
Perihepatic complicated fluid collection*, n (%)	16 (4.6)	1 (1.8)	1 (1.4)	.322
Liver failure*‡, n (%)	1 (0.3)	0 (0.0)	0 (0.0)	.835
POD 3 NPIS, median (range)	6 (1-9)	5 (1-8)	3 (1-7)	<.001
POD 5 NPIS, median (range)	4 (1-9)	3 (2-8)	3 (2-8)	<.001
Passage of flatus, median (range), d	4 (1-19)	3 (2-7)	3 (1-7)	<.001
Return to soft diet, median (range), d	5 (3-17)	4 (3-8)	4 (2-8)	<.001
Hospital stay, median (range), d	12 (6-96)	11 (6-55)	8 (5-27)	<.001

All mortality and morbidity were within 1 month.

*All detailed complications were Clavien-Dindo grade 3 or more severe.

†Pleural effusion, pneumothorax, pneumonia

‡Liver failure was defined as International study Group of Liver Surgery grade C.

Abbreviations: NPIS, Numeric Pain Intensity Scale

of all T4 tumors below 6cm had no restoration. Eighteen percent of APR resections are T4 tumors in contrast to 6 % of ULAR resections. Lymphatic involvement was similar between operations. APR is associated with open surgery in 65% of cases. The circumferential resection margin (CRM) was involved 12.2% of cases in contrast to 6.2% of ULAR cases ($p<0.001$).

Conclusions/Discussion: Our real world Australasian data demonstrates a third of patients having a non-restorative resection. Tumor height and T stage were the biggest predictors of APR with similar rates in both the urban and rural settings. There remains a spectrum of care with the potential for quality improvement across patients with rectal cancer.

CHANGES IN PATIENT REPORTED OUTCOMES AMONGST PATIENTS UNDERGOING SURGICAL TREATMENT FOR BENIGN ANORECTAL DISEASE.

P234

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Purpose/Background: Benign anorectal disease such as hemorrhoids and fissures are a common reason for office visits. While a substantial proportion of patients are successfully managed with conservative therapy, a subgroup of patients require surgical treatment. Patient reported outcomes (PROs) provides a convenient and evidenced based platform to assess symptoms such as pain and anxiety in this patient population. The aim of this study was to assess changes in in PROs amongst patients who undergo surgical procedures for hemorrhoids and fissures.

Methods/Interventions: Patients presenting to the outpatient colorectal clinic complete an electronic survey evaluating the Patient Reported Outcomes Instrumentation System (PROMIS) domains of physical function (PF), pain interference (PI), depression, and anxiety. These domains were integrated with the electronic medical and billing records of patients who underwent a definitive surgical procedure for anal fissures or hemorrhoids between January 2015 and October 2018.

The preoperative and postoperative scores were compared via a paired Student's t-test.

Results/Outcome(s): 946 patients were included in the cohort contributing 3175 unique encounters. 469 patients were excluded for only undergoing sigmoidoscopy or colonoscopy. Among these patients, 77 patients were treated for anal fissure and 400 patients were treated for hemorrhoids. The mean preoperative and postoperative for each domain. Among patients treated for hemorrhoids, the average change in PF score was 0.63 (standard deviation [SD]=7.00, $p=0.33$), the average change in PI was -0.58 (SD=7.75, $p=0.42$), the average change in anxiety was -2.30 (SD=7.12, $p=0.01$), and the average change in depression was -0.62 (SD=6.62, $p=0.30$). Among patients with anal fissure, the average change in PF was 1.86 (SD=7.36, $p=0.21$), the average change in PI was -2.12 (SD=7.61, $p=0.17$), change in anxiety was -2.43 (SD=9.58, $p=0.38$), and the change in depression was -2.28 (SD=5.42, $p=0.03$).

Conclusions/Discussion: The results of this study showed that despite a lack of statistically significant change in pain interference post-intervention for patients with anal fissure and hemorrhoids, there was a statistically significant improvement of the anxiety domain among hemorrhoid patients and the depression domain among anal fissure patients. These results demonstrate the importance in evaluating patient reported outcomes in patients with benign anorectal disease

ROBOTIC COLON SURGERY: A MATTER OF TIME -- HOW LENGTH OF STAY CHANGES IN ROBOTIC COLECTOMIES.

P235

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Purpose/Background: Robotic surgery is an emerging technology that has been shown to be a safe and feasible approach for colorectal resection. However, longer operative time and cost remains a concern in each institution. We sought to compare the impact of robotic surgery in

P234 Average Preoperative and Postoperative Domain Scores

Average Domain Score	Hemorrhoidal Disease	Anal Fissure
Preoperative Physical Function	45.60 (SD=10.40)	46.10 (SD=9.91)
Postoperative Physical Function	45.99 (SD=10.52)	47.53 (SD=10.00)
Preoperative Pain Interference	56.75 (SD=8.89)	58.20 (SD=9.83)
Postoperative Pain Interference	55.71 (SD=9.48)	56.24 (SD=10.36)
Preoperative Anxiety	52.83 (SD=10.63)	54.44 (SD=12.22)
Postoperative Anxiety	49.80 (SD=10.44)	54.47 (SD=11.08)
Preoperative Depression	48.98 (SD=10.77)	51.43 (SD=10.54)
Postoperative Depression	47.43 (SD=9.98)	48.14 (SD=9.84)

terms of operative times in reference to length of stay and return of bowel function in our institution.

Methods/Interventions: Under an IRB-approved protocol patient demographic, operative time, time to return of bowel function, and length of stay were abstracted from medical records for all patients undergoing colon resection at the University Texas Medical Branch hospital between 2012-2018. Cases were then grouped based on surgical approach (laparoscopic and robotic) and stratified by anatomic resection (right colectomy, left colectomy including left sided colon resection, sigmoid resection, rectal resection). Detailed costs and short-term clinical outcomes were analyzed. An independent samples t-test was used to compare modalities.

Results/Outcome(s): Of the 155 cases, 43% were performed laparoscopically (n = 67) and 57% robotically (n = 88). While the operative time was longer robotically than laparoscopically (290 minutes vs 256 minutes, p = 0.029), the time to return of bowel function was shorter (2.31 days vs 3.18 days, p = < 0.001) as was the mean length of stay (4.1 days vs 5.12 days, p = 0.01). Demographics, ASA, and BMI were similar between the two groups (p > 0.05).

Conclusions/Discussion: In terms of all colorectal procedures robotic and laparoscopic approaches are comparable. However, robotic surgery demonstrates a longer operative time, but shorter length of stay. A shorter hospital stay has a decreased overall cost when compared to longer operative times in laparoscopic surgery. Additionally, a quicker return of bowel function resulted in improved patient satisfaction. Further studies are necessary to determine differences in complications and recurrence rates in colorectal cancer patients.

THE ASSOCIATION BETWEEN PRE-OPERATIVE ORAL ANTIBIOTICS AND THE INCIDENCE OF POST-OPERATIVE CLOSTRIDIUM DIFFICILE INFECTION IN ADULTS UNDERGOING ELECTIVE COLORECTAL RESECTION: A SYSTEMATIC REVIEW AND META-ANALYSIS.

P236

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Purpose/Background: The risk of developing post-operative *Clostridium difficile* infection (CDI) as a result of prophylactic oral antibiotics (OA) remains controversial and a potential barrier to implementation of OA as means of reducing surgical site infection (SSI) in colorectal surgery. The objective of this study was to compare the incidence of post-operative CDI in patients receiving OA as part of pre-operative bowel preparation before colorectal surgery to those not receiving OA.

Methods/Interventions: We searched MEDLINE, EMBASE, Web of Science and Cochrane Library (to September 11, 2018) to identify comparative studies reporting on the incidence of 30-day post-operative CDI in adults receiving prophylactic OA compared to those not receiving OA as part of a bowel preparation regimen before undergoing elective colorectal surgery. Patient and treatment characteristics were narratively summarized and odds ratios (OR) were pooled using generalized linear/mixed effects models based on a binomial approximation of the exact likelihood.

Results/Outcome(s): Fourteen randomized controlled trials (RCTs) and 6 cohort studies comparing various regimens of bowel preparation with OA to those without OA were identified. Bowel preparation regimens were heterogeneous between studies. The incidence of CDI was low in RCTs (11 events among 2,753 patients). Moreover, among the 6 contemporary RCTs published after year 2000 (1994 patients), only 1 event was noted, which occurred in the no-OA group. Four RCTs could be included in meta-analysis. Although not statistically significant, meta-analysis of these 4 RCTs comparing OA group (9 events among 394 patients) to no-OA group (2 events among 400 patients) was suggestive of higher risk of CDI associated with OA use (OR=4.46, CI: 0.96-20.66). Meta-analysis of the cohort studies comparing OA group (306 events among 28,237 patients) to no-OA group (524 events among 31,301 patients) found no statistically significant difference in terms of post-operative CDI (OR=0.88, CI: 0.51-1.52); however, heterogeneity was high in the cohort studies (I²: 84.7).

Conclusions/Discussion: The incidence of CDI in patients who undergo colorectal surgery is very low, regardless of bowel preparation regimen used. Contemporary evidence suggests that the addition of prophylactic OA to pre-operative bowel preparation does not result in a significantly increased odds of developing CDI in adult patients undergoing colorectal surgery. Considering the beneficial role of OA in reducing SSI, the fear for CDI is not sufficient to omit OA in this setting. However, given the heterogeneity in the components of bowel preparations regimens used and the short-term follow-up for CDI in the included studies, the results of this study must be interpreted with caution.

A RANDOMIZED CONTROLLED TRIAL INVESTIGATING REGULAR DIET VERSUS CLEAR LIQUID DIET IMMEDIATELY FOLLOWING ELECTIVE COLORECTAL SURGERY.

P237

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Purpose/Background: Dietary management after elective colorectal surgery traditionally consisted of nil per os (NPO) and slow diet advancement as patients tolerated consumption due to concerns that early feeding might compromise the anastomosis or delay recovery of bowel function. Recently, the advent of enhanced recovery after surgery (ERAS) protocols has paired early feeding with other therapies to improve patient outcomes and to decrease hospital length of stay. There is increasing evidence suggesting that early feeding is not only safe but also beneficial to patients undergoing both emergency and elective colorectal operations. Spurred by the results of a recent randomized trial at our center demonstrating the superiority of a solid diet versus a clear liquid diet (CLD) on postoperative day POD1 after elective colorectal surgery, we embarked on a controlled trial comparing the use of a CLD vs a regular diet (RD) immediately after elective colorectal surgery.

Methods/Interventions: Consecutive patients were randomized to a CLD or RD immediately upon admission to the floor after undergoing elective colorectal surgery. CLD patients were advanced to a RD on POD1. RD patients were continued on their diet for the duration of their hospitalization. The primary study endpoint was diet tolerance, defined by absence of vomiting by POD2. Secondary endpoints included initial volume of diet consumed on POD0, antiemetic and narcotic use, ileus, use of nasogastric tube, time to first flatus and first bowel movement, postoperative length of stay and 30-day readmission. Ileus was defined as a condition characterized by a delayed return of bowel function associated with diet intolerance, nausea/emesis, and bloating. Quality of life (QOL) measurements of nausea, pain and bloating were evaluated by self-administered questionnaires using a visual analog scale of 0 to 10 on POD1, POD2 and day of discharge.

Results/Outcome(s): Between September, 2017 and June 2018, 100 elective colorectal surgery patients were randomized to CLD (n=50) or RD (n=50). Both patient groups were well-matched in all measured preoperative and intraoperative clinical features. The primary study endpoint, POD2 diet tolerance, was comparable between the CLD (n=41; 82%) and RD (n=41; 82%) patient arms (p=.72). Median volume consumed by CLD patients on POD0 was 450 cc (range, 0-2100 cc). The median percent of a regular meal consumed by RD diet patients on POD0 was 40% (range, 0-100%). More patients in the CLD group

(n=46; 92%) than in the RD group (n=34; 68%) tolerated their POD0 diet without nausea/vomiting (p=0.05). In both groups, about half of all patient needed antiemetic medication (CLD (n=25, 50%); RD (n=22; 44%); p=0.69). Median narcotic usage was the same between the two groups in both the first 24 hours (CLD = 1.0 mg intravenous (IV) hydromorphone equivalent (range, 0-5.0 mg) vs. RD = 0.55 mg (range 0-5.4 mg), p=0.28) and between 24-48 hours after surgery (CLD = 0 mg IV (range, 0-5.5 mg); RD = 0 mg IV (range, 0-4.2 mg) p=0.73). Median nausea, pain and bloating QOL scores were not significantly different between groups on POD 1, POD 2 and day of discharge. Ileus occurred at a similar rate in both patient arms (CLD (n=11, 22%); RD (n=11; 22%); p=1.0). Nasogastric tube use was similar between the two group (CLD (n=3, 6%); RD (n=2, 4%); p=0.72). Both groups regained bowel function on POD 1 (p=0.64). Median length of hospital stay in the CLD (3 days, range 1-15 days) and the RD (2.5 days; range 1-21 days) groups was not significantly different (p=0.74). There was also no significant difference in 30-day readmission between patient arms (CLD (n=8; 16%); RD (n=5; 10%); p=0.55).

Conclusions/Discussion: The immediate use of a RD instead of a CLD is not associated with improvement in any postoperative outcome after elective colorectal surgery. In fact, our data suggests that patients given a RD immediately after surgery do not tolerate their diet as well as patients given a CLD. There appears to be no benefit of providing a RD vs a CLD on POD0 after elective colorectal surgery.

TYING AND TEARING IN ROBOTIC AND LAPAROSCOPIC INTRACORPOREALLY HAND-SEWN ILEOCOLIC ANASTOMOSES. A PROPENSITY SCORE MATCHED PROSPECTIVE STUDY.

P238

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Purpose/Background: There are concerns regarding the impact of the lack of tactile feedback in robotic surgical systems on tearing of tissue. The aim of this study was to evaluate the impact of the ergonomics of laparoscopy as well as the lack of tactile feedback in robotics on intracorporeal suturing.

Methods/Interventions: This was a prospective cohort study comparing the first 12 consecutive robotic hand-sewn ileocolic anastomoses to matched laparoscopic cases performed by the same surgeon. The endpoints were interrupted suturing and tying time, number of interrupted sutures placed and torn. Propensity score matching was based on age, body mass index, previous abdominal surgery, and diagnosis. Ileocolic anastomoses were

hand-sewn in two layers: running 3-0 polyglycolic acid, and interrupted 3-0 silk. Continuous variables were compared using Student t test, whereas Chi square test was used to compare categorical variables. Linear regression and cumulative sum analysis were employed for quality control.

Results/Outcome(s): Median time for robotic suturing and tying was significantly shorter [89.5 sec (IQR 76-103.5) vs. 160 sec (IQR 146-210), $p < 0.0001$]. There were fewer torn sutures in laparoscopic suturing [1 (IQR 1-2.5) vs. 0 (IQR 0-0.5), $p < 0.0026$]. No differences were found in complication rates (6 vs. 2 $p = 0.19$). CUSUM analysis did not show significant improvement in the number of torn sutures over time.

Conclusions/Discussion: In spite of more torn sutures, time for robotic suturing and tying was significantly shorter when compared to laparoscopic intracorporeal suturing. This study suggests the lack of tactile feedback rather than a learning curve to be behind tearing sutures.

THE RELATIVE EFFECTS OF OBESITY, DIABETES AND ELEVATED HEMOGLOBIN A1C ON POST-OPERATIVE WOUND INFECTIONS AFTER COLORECTAL SURGERY.

P239

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Purpose/Background: Diabetes (DM) has been historically associated with an increased risk of superficial surgical site infection (SSI). However, DM is frequently coincident with a higher Body Mass Index (BMI), which in itself is a strong predictor of SSI. Our previous work using a large NSQIP dataset indicated that the association between superficial SSI and DM loses statistical significance when the sample was controlled for BMI. On the other hand, BMI remained significant despite controlling for DM. The NSQIP data was limited by the lack of availability of hemoglobin A1c (HbA1c) values. Therefore, we sought to evaluate our institutional data including HbA1c values, BMI and DM to determine if the same relationship existed between these variables and superficial SSI after colorectal surgery.

Methods/Interventions: After IRB approval, a query of patients who underwent colorectal surgeries between 2011-2017 was performed. Colectomies performed by Board Certified Colon and Rectal Surgeons were included and superficial SSI were documented. Patient demographics and post-operative wound related outcomes were recorded. Emergent cases were excluded. HbA1c levels within a month immediately preceding the surgery were used for this analysis. Univariate analysis was performed using Fisher's Exact Test and two-tailed p values were calculated.

Results/Outcome(s): A total of 3174 patient records were included. The average age of our patients was 62 years in the diabetic group and 55.9 years in the non-diabetic group, 17.3% were diabetic, 36.8% had a BMI > 30 . HbA1c levels were available for 777 patients out of which 430 (55.3%) had a HbA1c of 5.7% or higher. Our research revealed that BMI > 30 had a significant association with superficial SSI ($p = 0.042$). The association between superficial SSI and DM or elevated HbA1c (5.7% or higher) was not statistically significant ($p = 1$ and 0.11 respectively).

Conclusions/Discussion: Based on our data, it appears that BMI > 30 is a stronger predictor of superficial SSI after colorectal operations compared to DM or elevated HbA1c levels. Our results also suggest that the increased superficial SSI rate observed in diabetics is primarily due to co-existent elevations in BMI in this patient population rather than poor glycemic control, concordant with the findings from the NSQIP dataset.

23-HOUR RIGHT HEMICOLECTOMY FEASIBILITY STUDY.

P240

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Purpose/Background: The evolution of enhanced recovery pathways as a part of the Enhanced Recovery After Surgery (ERAS) protocol is standardizing perioperative care. With the adoption of ERAS programs patients are being discharged earlier. In the United States, a colectomy is associated with an average of 7 to 10 day hospital

P239 Institutional Results

Patient Characteristics	Superficial Surgical Site Infection	No Superficial Surgical Site Infection	p Value	Odds Ratio
Diabetic	50	500	1.0000	0.997
Nondiabetic	239	2385		
Normal HbA1c	34	314	0.1101	0.643
High HbA1c	28	402		
BMI < 30	160	1755	0.0429	1.300
BMI > 30	118	995		

Odds ratios (95% CI) and p values for Superficial SSI after Colorectal Surgery

stay. However, with a persistent and uniform implementation of ERAS, patients after right hemicolectomy (RHC) have been safely discharged within 48 hours from surgery with single cases within 24 hours.

Methods/Interventions: This is a retrospective review of all elective right hemicolectomy patients who underwent surgery at a single, tertiary care center between January 2016 and September 2018. All patients were operated on by one of three colorectal surgeons. The inclusion criteria consisted of open, laparoscopic and robotic right-sided colectomy for both benign and malignant diseases. All patients underwent the standardized ERAS protocol at our institution including pre-operative education and active post discharge surveillance. The primary aim of this study was to demonstrate that hospital length of stay can be reduced to an overnight observation stay (< 24 hours) in these patients.

Results/Outcome(s): A total of 113 patients were included in the study (55.8% female). Of these 113 patients, 18 (16%, 18/113) were discharged on postoperative day (POD) 1 and 43 patients were discharged on POD 2 (38%, 43/113). Patients discharged on POD 1 were placed in the 23-hour (23h) colectomy group. Patients discharged on POD 2 were placed in the 48-hour (48h) colectomy group. The remainder of the patients were placed in the 48+ hour (48h+) colectomy group. The surgical approaches taken on 23h patients differed significantly ($p = 0.0036$) from the 48h and 48h+ patients, with no open RHC patients discharged on POD 1 or POD 2. Mean body-mass index (BMI) was equal among the three groups ($p = 0.502$); however, the mean age was different amongst the three groups ($p = 0.0006$). Mean ages for 23h and 48h patients were 64 ± 8.05 , 65.5 ± 12.7 years, respectively. The mean age for 48h+ group was 74.4 ± 13.2 years. There was a significant difference in mean age when comparing the 48h+ group independently against the 23h and 48h groups (48h+ vs. 23h, $p = 0.0104$; 48h+ vs. 48h, $p = 0.0019$). 23h and 48h patients were generally 6 years younger than 48h+ patients. In the 23h group, 14 patients were American Society of Anesthesiologists (ASA) class II (78%) and 4 patients were ASA class III (22%). The number of ED visits ($p = 0.9248$) and readmissions ($p = 0.5115$) prior to or on POD 30 remained comparable among the 3 groups. In the 23h group, 3 patients (17%, 3/18) returned to the emergency department by POD 30 and were re-admitted. In the 48h group, 7 patients (16.3%, 7/43) returned to the emergency department by POD 30 and 3 were readmitted (6.9%, 3/43). In the 48h+ group, 10 patients (19.2%, 10/52) returned to the emergency department by POD 30. Six of these patients were subsequently readmitted (11%, 6/52). Readmissions and ED visits for the 23h group presented as follows: The first readmitted patient with Crohn's disease presented on POD 2 with gastrointestinal bleeding from the anastomosis requiring argon beam coagulation. The second readmitted patient presented on POD 4 with early small

bowel obstruction (SBO) that resolved with non-surgical management. The third readmitted patient presented on POD 25 with abdominal pain and was readmitted due to an anastomotic micro leak managed non-operatively. A non-readmitted patient presented to the ED with symptoms of uncomplicated urinary tract infection (UTI) and was subsequently discharged home with oral ciprofloxacin. All patients completed their follow up visits including one in 2 weeks and a subsequent visit at 6-12 weeks. No surgical complications were reported on follow up visits. There were no wound infections recorded. Of all the non-cancer patients, 24% (9/37) were discharged on POD 1; however, of all the cancer patients only 12% (9/76) were discharged on POD 1 ($p = 0.0888$).

Conclusions/Discussion: The introduction of ERAS and implementation of laparoscopic and robotic colon surgery is shortening the length of hospital stay in patients with benign and malignant colorectal diseases. 23 hour right-sided colectomies may be achieved with the same low-risk and low-morbidity, but at a significantly lower cost due to shorter length of stay. Our presented case series demonstrates that a multimodal, fast-track approach can allow for safe hospital discharge on POD 1. The rate of ED visits remains the same for both 23h, 48h and 48h+ patients. Early discharge patients require close follow up, adequate education about warning signs, and active post discharge surveillance.

FACTORS ASSOCIATED WITH POSITIVE CIRCUMFERENTIAL RESECTION MARGIN AFTER PROCTECTOMY FOR RECTAL CANCER.

P241

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Purpose/Background: High quality total mesorectal excision with negative distal and circumferential resection margin (CRM) is the gold standard for curative-intent rectal cancer surgery. A positive CRM increases the risk of local recurrence and distant metastasis in patients undergoing proctectomy for rectal cancer. Identification of factors associated with a positive CRM could help reduce positive CRM rates. This study aims to identify risk factors for positive CRM using the new American College of Surgeon's National Surgical Quality Improvement Program (ACS-NSQIP) Proctectomy Procedure Targeted Database. We hypothesize that tumor size and location are predictive of positive CRM independent of other factors.

Methods/Interventions: We queried the ACS-NSQIP Proctectomy Procedure Targeted Database for years 2016-2017. Patients with malignant neoplasms of the rectum who underwent laparoscopic, open, or robotic proctectomy were included. Patients undergoing emergent or non-elective surgery were excluded as were patients

with ASA scores of 5 and those without data regarding neoadjuvant therapy, tumor location, or CRM positivity. CRM was considered positive if the clear margin was ≤ 1.0 mm. Groups were stratified according to CRM status with patient demographics, tumor characteristics, perioperative factors and postoperative outcomes compared between groups. Univariate and binary logistic regression analyses were performed to identify factors independently associated with positive CRM. Factors with $p < 0.10$ on univariate analysis were carried forward for the regression analysis. Statistics were performed using IBM-SPSS v22 (IBM Corp, Armonk, NY) and Student-T test, Chi-square, and Fisher's exact tests were performed where appropriate with $p = 0.05$.

Results/Outcome(s): Of the 1,345 patient included in this study, 92 (6.8%) had positive CRM. 32.1% underwent low anterior resection (LAR), and 66.9% underwent abdominoperineal resection (APR). Patient age, gender, race, BMI, ASA score, and wound classification did not differ between those with positive or negative CRM. Positive CRM patients more often had dyspnea (9.8% vs. 4.6%, $p = 0.042$); however, no significant differences in other comorbidities were identified. Tumor location and operative approach did not differ. Patients with positive CRM had nonsignificant trends toward receiving less neoadjuvant chemoradiotherapy (58% vs. 66%, $p = 0.125$), and more frequent abdominoperineal resections (76% vs. 66%, $p = 0.053$). Patients in the positive CRM cohort were found to have tumors with higher clinical T stage ($p = 0.016$). Preoperative dyspnea, operation type, tumor downstaging, and Clinical T stage met criteria for inclusion in the binary logistic regression analysis which demonstrated tumor downstaging (OR 0.449, 95% CI 0.227-0.889, $p = 0.022$) and Clinical T4 lesions (OR 4.988, 95% CI 1.276-19.497, $p = 0.021$) were independently associated with a positive CRM whereas dyspnea (OR 2.612, 95% CI 0.936-7.289, $p = 0.067$), LAR (OR 0.814, 95% CI 0.407-1.630, $p = 0.561$), and clinical T3 lesions (OR 1.783, 95% CI 0.525-6.059, $p = 0.354$) were not. Limitations: This new database captures proctectomy specific CPT codes and therefore overestimates the percentage of patients undergoing APR for rectal cancer.

Conclusions/Discussion: In a retrospective review of the ACS-NSQIP Proctectomy Procedure Targeted Database for years 2016-2017, rates of CRM positivity were lower than previous reports. Patients with clinical stage T4 lesions had a higher risk for a positive CRM. In the modern era of high-quality total mesorectal excision, commonly quoted factors such as gender, BMI, tumor location, neoadjuvant therapy, and operative approach may be less associated with CRM positivity than previously thought.

ROBOTIC, LAPAROSCOPIC AND OPEN COLECTOMIES: A COMPARISON OF OUTCOMES USING THE AMERICAN COLLEGE OF SURGEONS NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM.

P242

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Purpose/Background: Since the advent of robotic platforms, robotic colorectal surgery has increased in popularity. Since 2013, the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) has included data on robotic surgery, in addition to that previously collected on laparoscopic and open surgeries. The purpose of this study is to evaluate the outcomes of robotic assisted colectomy compared to laparoscopic and open approaches using five-year aggregate data from the ACS-NSQIP.

Methods/Interventions: The ACS-NSQIP Participant Use Data Files (PUF) and Procedure Targeted Colectomy PUF from 2013-2017 were combined to create an aggregate dataset. All colectomies were classified as robotic, laparoscopic or open, then evaluated in an intention-to-treat fashion. Demographics and 30-day outcomes data were evaluated using univariate and multivariate analysis. Odds ratios were generated using the multivariate model, with robotic approach as the reference. Patients who underwent low pelvic surgery were identified using primary procedure Current Procedural Terminology codes of 44145, 44146, 44147, 44207, 44208. Comparative analyses were repeated for the low pelvic surgery population.

Results/Outcome(s): 147,075 colectomies were identified, including 82,761 laparoscopic, 53,475 open cases, and 10,839 robotic. Mean operative time was significantly longer for robotic colectomies (233 min, SD 105 min) than laparoscopic (180 min, SD 95 min) or open (166 min, SD 113 min) procedures. Laparoscopic procedures are more likely to convert to open ($n = 10,559$, 12.8%) than robotic ($n = 671$, 6.6%). Univariate analysis comparing robotic to laparoscopic colectomy shows that robotic colectomy is associated with a decreased length of stay (LOS) (4.8 days vs 6.1 days), decreased need for transfusions (4.5% vs 6.1%), decreased mortality (0.3% vs 0.6%), decreased postoperative ileus (9.6% vs 11.2%), decreased prolonged ventilator requirements (0.6% vs 0.9%), decreased superficial wound infection (2.6% vs 3.6%), decreased deep wound infection (0.4% vs 0.6%), and decreased wound dehiscence (0.2% vs 0.6%). Of these, operative time, LOS, transfusion requirement (OR 1.4, CI 1.3-1.6), superficial infection (OR 1.4, CI 1.2-1.6), and wound dehiscence (OR 2.9, CI 1.7-3.6) remain statistically significant on multivariate analysis. On multivariate analysis, both robotic and laparoscopic approaches had lower complication rates than open surgery (Table 1). For patients who underwent

P241 Patient Demographics, Preoperative and Postoperative Variables

	Negative CRM (N=1253)	Positive CRM (N=92)	p-value
AGE (years +/- SD)	61.5 +/- 12.5	61.1 +/- 12.9	0.827
MALE	61.8%	57.6%	0.439
RACE	-----	-----	0.913
-Caucasian	67.2%	67.4%	
-African American	5.3%	4.3%	
-Other	27.5%	28.3%	
BMI +/- SD	28.1 +/- 6.3	26.7 +/- 6.5	0.607
COMORBIDITIES	-----	-----	-----
-DM	16.3%	14.1%	0.588
-Dyspnea	4.6%	9.8%	0.042
-COPD	3.2%	6.5%	0.125
-Smoking	18.8%	17.4%	0.746
-CHF	0.3%	0.0%	1.000
-HTN	41.6%	40.2%	0.798
-Weight Loss	6.3%	7.6%	0.622
ASA CLASSIFICATION	-----	-----	0.840
-1	1.8%	1.1%	
-2	36.2%	32.6%	
-3	58.2%	62.0%	
-4	3.8%	4.3%	
WOUND CLASSIFICATION	-----	-----	0.340
-1	0.6%	1.1%	
-2	85.7%	83.7%	
-3	11.9%	10.9%	
-4	1.8%	4.3%	
NEOADJUVANT CHEMORADIOTHERAPY	65.5%	57.6%	0.125
-Yes	34.5%	42.4%	
-No			
TUMOR LOCATION	-----	-----	0.501
-Low (<5cm)	54.6%	60.9%	
-Middle (5-10cm)	33.6%	29.3%	
-High (>10cm)	11.8%	9.8%	
OPERATIVE APPROACH	-----	-----	0.053
-Abdominoperineal Resection	66.2%	76.1%	
-Low Anterior Resection	33.8%	23.9%	
OPERATIVE PLATFORM	-----	-----	0.250
-Planned Open	36.6%	46.7%	
-Laparoscopic	33.7%	26.1%	
-Robotic	24.3%	21.7%	
-Converted to Open	5.5%	5.4%	
PREOPERATIVE T	-----	-----	0.016
-T2 or less	22.7%	17.1%	
-T3	65.0%	59.2%	
-T4	12.4%	23.7%	
PREOPERATIVE N	-----	-----	0.990
-N0/Nx	47.0%	47.0%	
-N1+	53.0%	53.0%	
PREOPERATIVE M	-----	-----	0.350
-M0/Mx	95.6%	93.4%	
-M1	4.4%	6.6%	
POSTOPERATIVE T	-----	-----	<0.001
-T2 or less	49.6%	16.5%	
-T3	43.6%	73.6%	
-T4	6.8%	9.9%	
POSTOPERATIVE N	-----	-----	0.001
-N0/Nx	66.0%	47.3%	
-N1+	34.0%	52.7%	
POSTOPERATIVE M	-----	-----	0.224
-M0/Mx	96.0%	93.1%	
-M1	4.0%	6.9%	
DOWNSTAGED T AFTER NEOADJUVANT THERAPY	-----	-----	0.084
-Yes	52.1%	38.6%	
-No	47.9%	61.4%	

low pelvic surgery (n=37,526), the robotic approach was again associated with longer operative times, compared to laparoscopic (252 vs 216 min), with decreased LOS (4.9 vs 5.6 days). Compared to laparoscopic, robotic was again associated with decreased transfusion requirements (OR 1.5, CI 1.2-1.9), decreased superficial infection (OR 1.4, CI 1.1-1.8), and decreased wound dehiscence (OR 3.8, CI 1.4-10.5) on multivariate analysis. Again, both robotic and laparoscopic approaches had lower complication rates than open surgery for low pelvic surgery on multivariate analysis.

Conclusions/Discussion: In the study period, robotic assisted approaches, despite taking longer to perform, demonstrates a decreased LOS and diminished risks of transfusion requirements, superficial wound infection, and wound dehiscence. Both minimally invasive approaches demonstrate superior outcomes to open colectomy. Robotic colectomy may have superior outcomes compared to other minimally invasive techniques.

LAPAROSCOPIC RESECTION IN PATIENTS 80 YEARS OLD AND OLDER.

P243

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Purpose/Background: An aging population has presented the surgical community with the challenge of performing major colon resections in the elderly. By year 2030 Americans over the age of 65 will comprise 20% of the total population and the group of individuals over 85 is expected to triple in number over the next 4 decades. Fears regarding high operative mortality rates often hinder optimal surgical options of octogenarian and nonagenarian patients. Minimally invasive colorectal surgery has been shown to be associated with less blood loss and improved postoperative pulmonary and functional status. While these outcomes are especially advantageous in elderly patients, many surgeons do not offer laparoscopic colorectal resections to older patients due to a multitude of concerns regarding operative times and perceived limits and dangers of laparoscopic surgery in this group of patients. Mindful that the one-year mortality for the general population of 84-year-olds in the U.S. is 8%, we evaluated short and long term morbidity and mortality following laparoscopic colorectal resections from our colorectal laparoscopic database and compared it to the NSQIP data for patients over 80 years old to determine if laparoscopic surgery has an acceptable risk of mortality and can be considered a reasonable treatment option.

Methods/Interventions: A prospective database of laparoscopic procedures was queried to identify all patients ≥ 80 who had undergone a laparoscopic colorectal resection.

From 1996 to 2018, 2,462 laparoscopic procedures were performed. From this database, we identified 248 patients 80 years and older who had undergone a laparoscopic resection. For a comparison, the NSQIP database was queried for patients who underwent major laparoscopic resections between years 2012-2016. 7,765 patients over the age of 80 were identified, and stratified to open (4392, 56.6%) and laparoscopic (3373, 43.4%) cases. Both sets of data were analyzed for demographic factors, morbidity, 30 days mortality, and discharge destination. Our data was compared to NSQIP outcomes for open and laparoscopic surgeries. Additionally our 1-year and 5-year mortality rates were included from our database as NSQIP has no available comparisons.

Results/Outcome(s): For our database indications for surgery were malignancy 167(67%), diverticulitis 28(11.3%), rectal prolapse 2 (1%), polyps 9(3.7%) and other 42(17%). Of 248 patients the conversion rate is 2.4 percent. Median estimated blood loss was 100 mL. Eight patients 3.2% received intraoperative blood transfusion. Anastomotic leak occurred in 2 patients (0.8%). 93% of the patients went to telemetry postoperatively, not ICU. Disposition to home was 67% in our data compared to NSQIP rate of 50% of patients receiving open surgery and 73% by laparoscopy. Overall 30 day mortality was 3.1 % for both laparoscopic databases compared to 12.3% for open surgery. One year mortality was 10% in our data and five-year survival was 60%.

Conclusions/Discussion: Major colorectal resections can be performed laparoscopically in patients 80 years and older with low morbidity and mortality. Our laparoscopic analysis of both databases demonstrates identical results of low 30-day mortality rate, both unadjusted and adjusted, and is significantly lower when compared to open surgery. The data from our institution for one year and long term follow up demonstrates good outcomes as well. Minimally invasive colorectal surgery offers excellent outcomes and should be encouraged, not withheld, in the 80+ year old population. This data supports the aggressive application of MIS approaches for patients greater or equal 80 years of age.

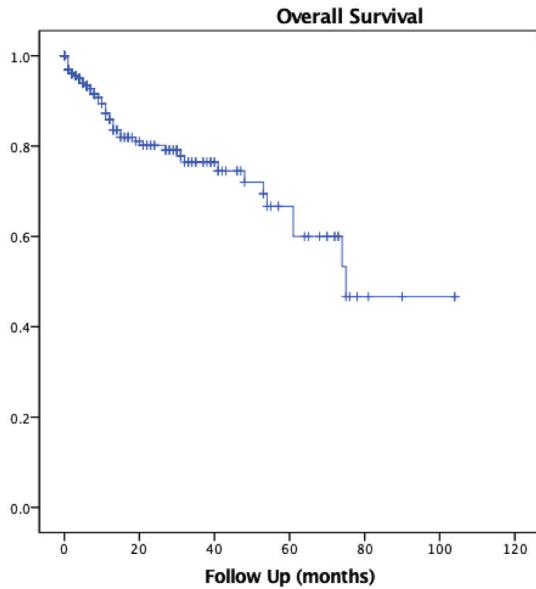


Figure 1. 5 Year overall survival rate for laparoscopic resection – Kaplan Meier analyses of our institutional database.

DO MINIMALLY INVASIVE SURGICAL TECHNIQUES CHANGE THE WAY COLORECTAL SURGERY AFFECTS PATIENTS?

P244

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Purpose/Background: The proposed benefits of minimally invasive techniques in abdominal surgery include reduced pain, smaller scars, less restrictions in activities, and better cosmesis. When these are touted to patients their expectations of a “better than expected” outcome are raised. We performed a study to measure how minimally invasive abdominal surgery techniques performed relative to the preoperative expectations of the patients.

Methods/Interventions: Patients undergoing elective abdominal colorectal surgery were recruited. Five survey instruments were used to evaluate patient expectations and attitudes: Preoperative Patients Expectations Questionnaire, Postoperative Patients Expectations Questionnaire, SF-36 Questionnaire, Short-Form McGill Pain Questionnaire, and the Cleveland Clinic Global Quality of Life Scale (CGQL). These were administered preoperatively, and at 6 and 12 months postoperatively. Because low recruitment increased the chances of a type II error (false negative), datapoints with a p value of <0.20 are presented in the table.

Results/Outcome(s): 69 patients were recruited; 24 had an open technique, and 45 had a minimally invasive technique (MIS). Both groups had similar preoperative expectations on a wide range of factors including pain levels, scarring, appearance, sexual function, attractiveness, confidence and satisfaction. Both groups had similar preoperative quality of life scores on SF36 and CGQL scales. 6 months after surgery the MIS group felt less

change in attractiveness and less effect of the surgery on sexuality. They also had better bowel function and less difficulty with being naked. They would be more inclined to recommend surgery at 6 months and to undergo it again. The only difference in QOL at 6 months was in physical functioning as measured by SF-36. 12 months after surgery the MIS group had less trouble with a range of scar-related issues; they were still more comfortable being naked and felt that their appearance interfered with relationships less. Surgery interfered less with their normal activities and preop expectations had been met to a greater degree. There was no difference in QOL, either by CGQL or SF-36, but more MIS patients were sexually active.

Conclusions/Discussion: Small numbers of patients limit the ability to draw firm conclusions. However there is an overwhelming tendency for the data to favor MIS in terms of scarring, and the impact of surgery on attractiveness, lifestyle, sexuality and the ability to meet preoperative expectations.

Factor	Total (N=69)	Laparoscopic (N=45)		Open (N=24)		p-value
		n	Statistics	n	Statistics	
At 6 months postop:						
SF-36 Role Limitations due to Physical Health	61.4±43.9	44	69.9±42.0	24	45.8±44.0	0.030 ^a
SF-36 Physical Function	80.7±21.0	44	84.0±18.9	24	74.7±23.6	0.082 ^a
Change from preop to 6 months postop:						
Attractiveness	-0.19±3.2	44	0.50±2.9	24	-1.5±3.4	0.015 ^a
Difficulty Naked	0.22±2.5	44	0.55±2.5	24	-0.38±2.5	0.15 ^a
Scar Changing Lifestyle	0.50±2.3	44	0.82±2.3	24	-0.08±2.2	0.13 ^a
At 1 year postop:						
Scar Changing Lifestyle	0.87±1.8	36	0.47±1.5	18	1.7±2.1	0.019 ^a
Difficulty Naked	1.07±2.2	36	0.72±1.8	18	1.8±2.9	0.10 ^a
Surgery Interfere w/ Normal Activities	1.9±2.3	35	1.6±1.9	18	2.7±2.8	0.10 ^a
Scar Importance	1.5±2.6	36	1.1±2.4	18	2.3±2.7	0.11 ^a
Expectations Met	8.1±2.5	35	8.5±2.1	18	7.3±3.1	0.11 ^a
Pain Influence Attractiveness	3.0±3.9	34	3.6±4.2	17	1.8±2.8	0.12 ^a
Happiness w/ Surgery	8.2±2.6	36	8.6±2.0	18	7.4±3.4	0.12 ^a
Appearance Influence Attractiveness	3.1±3.8	34	3.6±4.1	17	2.1±2.9	0.18 ^a
Time to Return to Usual Way of Life Influencing Unattractiveness of Illness	4.7±3.9	34	5.4±3.9	17	3.2±3.6	0.054 ^d
Appearance Interfered with Relationships	1.2±2.5	35	0.80±2.1	18	1.9±3.0	0.13 ^a
Symptom Improvement Influence Attractive	4.8±4.4	34	5.4±4.5	17	3.5±4.0	0.14 ^a
Sexually Active?		36		18		0.29 ^c
- No	16(29.6)		9(25.0)		7(38.9)	
- Yes	38(68.5)		27(75.0)		11(55.6)	

Statistics presented as Mean ± SD or N (column %).
 p-values: a=ANOVA, b=Kruskal-Wallis test, c=Pearson's chi-square test, d=Fisher's Exact test.

THE IGF-1R INHIBITOR NVP-ADW742 SENSITIZES RADIORESISTANT HUMAN COLORECTAL CANCER TO RADIOTHERAPY.

P245

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Purpose/Background: Neoadjuvant radiotherapy has become an effective treatment to improve outcomes in patients with rectal cancer. As radioresistance has been an important obstacle in rectal cancer treatment, new strategy

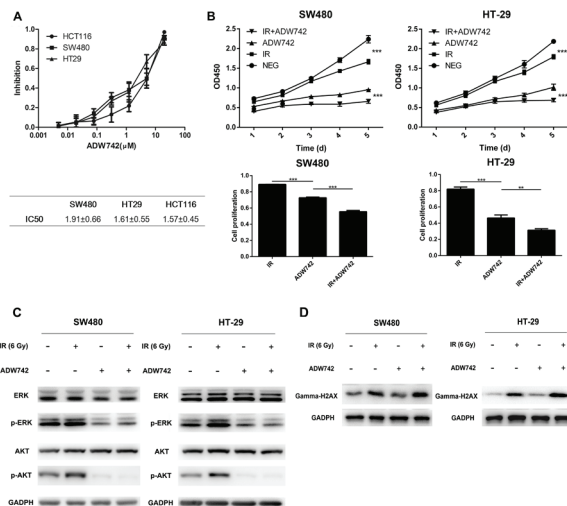
to increase radiosensitivity is urgently needed. Insulin like growth factor receptor 1 (IGF-1R) is well-documented to play a key role in radiation response, thus offering an attractive drug target to enhance tumor sensitivity to radiotherapy.

Methods/Interventions: The relationship between IGF-1R expression and radioresistance was confirmed in both biopsied tumor tissue and cancer cell lines. NVP-ADW742, an IGF-1R inhibitor, in combination with radiation was studied. Compared with radiation alone, this combined treatment exhibited an activity in inhibition of cell proliferation and DNA repair defect in radioresistant colorectal cancer cell lines SW480 and HT-29. In both cell lines, the addition of NVP-ADW742 to radiation further decreased cell colony formation. Dose-survival curves indicated that NVP-ADW742 increased the radiosensitivity of both HT-29 and SW480 cell lines significantly. The radiosensitization by NVP-ADW742 may be attributable to its strong effect on inhibiting pathways downstream of IGF-1R involved in cell proliferation and DNA repair.

Results/Outcome(s): The IGF-1R expression in tumor biopsies after neoadjuvant radiotherapy was assessed by immunohistochemistry. IGF-1R staining was considering IGF-1R overexpression in radioresistant group. NVP-ADW742 enhances the sensitivity of colorectal cancer cell lines SW480 and HT-29 cells. IGF-1R inhibitor NVP-ADW742 augments the inhibitory effect of radiation on cell proliferation of colorectal cancer cell lines SW480 and HT-29. What's more, The addition of NVP-ADW742 to radiation affects the key signaling molecules of the IGF-1R pathway, like Akt and Erk. DNA repair was interfered by NVP-ADW742 in the present of radiation.

Conclusions/Discussion: Many researches have paid attention to the overexpression of IGF-1R in the colorectal cancer. Here, we examined the level of IGF-1R proteins in the clinical specimens, and found that IGF-1R expression was positively correlated with the tumor resistance to radiotherapy. Also, the relationship between IGF-1R high-expression and radioresistance was confirmed in the human colorectal cancer cell lines. The cellular responses mediated by IGF-1R are attributable to a combination effect of its downstream signaling pathways, including the MAPK and PI3K pathways. It is reported that MAPK pathway mainly mediates cell proliferation and differentiation, whereas PI3K pathway tends to also induce anti-apoptosis and cell survival. Radiation has been shown to induce Akt activation in multiple cell types. In our present study, radiation also induced Akt activation in human colorectal cells. However, when we used NVP-ADW742 in combination with radiation, Akt activation was nearly completely blocked. Despite of pAkt, pErk could also be inhibited effectively by NVP-ADW742. In addition, previous studies showed that IGF-1R is involved in onhomologous end-joining DNA repair. It plays a key role in protecting cells from DNA damages induced by radiation. Our results showed that the addition of NVP-ADW742 to radiation enhances accumulation of DNA damage. NVP-ADW742

is a selective IGF-1R inhibitor, which inhibits the in vitro kinase activity by binding to ATP-binding pocket of IGF-1R. The antitumor activity of NVP-ADW742 has been studied in lung cancer, medulloblastoma, multiple myeloma, acute myeloid leukemia, and Ewing sarcoma cells. It was the first time to combine NVP-ADW742 with radiation and explore its radiosensitivity in human colorectal cancer cells. Inhibition of IGF-1R by NVP-ADW742 could augment the inhibitory effect of radiation on cell proliferation of human colorectal cancer cells SW480 and HT-29. In both HT-29 and SW480 cell lines, the addition of NVP-ADW742 to radiation has further decreased cell colony formation. Importantly, the dose-survival curves indicated that NVP-ADW742 could significantly enhance the radiosensitivity in HT-29 and SW480 cells. Thus, the radiosensitization caused by NVP-ADW742 could be explained by its strong effect on blocking activation of IGF-1R downstream signaling involved in modulating cell proliferation and modulating DNA repair. In conclusion, our study showed that IGF-1R expression may be a predictive factor for tumor response to radiotherapy, and IGF-1R may be a suitable target for combination treatment with radiotherapy. Importantly, NVP-ADW742, the IGF-1R inhibitor, could sensitize radioresistant human colorectal cancer cell lines to radiation, suggesting that combination of NVP-ADW742 and radiotherapy has great potential to be translated to clinic.



NVP-ADW742 augmented the inhibitory effect of radiation on cell proliferation and affected the IGF-1R pathway and gamma-H2AX. (A) The cell proliferation inhibition curves were drawn with the inhibition ratio of NVP-ADW742 on SW480, HT-29 and HCT116 cells. The IC50 values of NVP-ADW742 against cells were shown as below. (B) The cell growth curves of SW480 and HT-29 cells with indicated treatments were determined by CCK8 assay daily for 5 consecutive days. The cell proliferation rates on day 5 were calculated. Error bars, SD. **, $P < 0.01$; ***, $P < 0.001$; ANOVA. (C) Immunoblots examining the phosphorylation of Akt and Erk in SW480 and HT-29 cells treated with radiation, NVP-ADW742 or radiation plus NVP-ADW742. (D) Immunoblots assessing the level of gamma-H2AX in SW480 and HT-29 cells with indicated treatments. All experiments were performed in triplicate ($n = 3$).

THE STANDARDIZATION OF OUTPATIENT PROCEDURE (STOP) NARCOTICS AFTER ANORECTAL SURGERY: A PROSPECTIVE NON-INFERIORITY STUDY TO REDUCE OPIOID USE.

P246

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Purpose/Background: Prescription of opioid medication after ambulatory anorectal surgery can be excessive. Prolonged opioid use and diversion of unused medication are risk factors for opioid abuse, which has become a public health crisis. Our objective was to evaluate the efficacy of a multi-modality opioid sparing approach (STOP Narcotics) to control post-operative pain and reduce opioid prescriptions after outpatient anorectal surgery.

Methods/Interventions: A prospective non-inferiority study was conducted at 3 academic hospitals from July 2017 to April 2018. The STOP Narcotics initiative is a multi-pronged analgesia bundle integrating patient education, health care provider education, and intra/post-operative analgesia focused on multi-modal opioid-reduced prescriptions and pain control strategies. Patients 18-75 years of age and undergoing outpatient anorectal surgery were included. Patients with chronic pain, history of regular opioid use, chronic kidney disease or active peptic ulcer disease were excluded. Patient-reported average pain in the first seven post-operative days was the primary outcome. Secondary outcomes included patient-reported quality of pain management, medication utilization, prescription refills and medication disposal.

Results/Outcome(s): 93 patients underwent outpatient anorectal surgery (42 pre-intervention and 51 post-intervention). No difference was seen in average post-operative pain in the pre- vs. post-intervention groups (2.8 vs. 2.6 on 10 point scale, $p = 0.33$) or patient-reported quality of pain control (good/very good in 57% vs. 58%, $p = 0.58$). The median total morphine equivalents prescribed was significantly less (112.5 [IQR 50-150] pre-intervention vs. 50 [IQR 50-50] post-intervention, $p = 0.001$), while the use of other medications significantly increased (Figure 1). In the post-intervention group, only 45% of patients filled their opioid prescription, and the median opioid use was 12.5 morphine equivalents (2.5 pills).

Conclusions/Discussion: A variety of outpatient anorectal surgeries were included, with small sample sizes of subgroups. The STOP Narcotics protocol was a successful division-wide surgical initiative. While pain control strategies after surgery must consider the individual patient's needs, a standardized multi-modality analgesia bundle significantly decreased opioid prescribing without an increase in patient-reported post-operative pain.

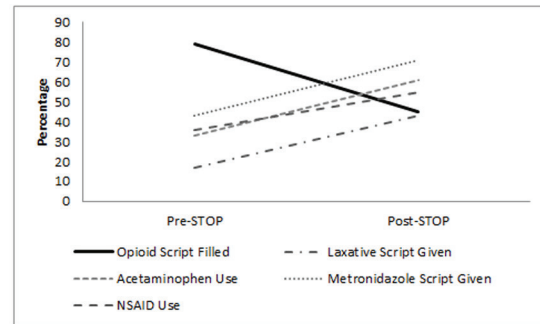


Figure 1: Utilization of Multi-Modal Analgesia Medications, Pre- and Post-Intervention

CLINICAL OUTCOMES AND HEALTHCARE PROVIDER COMPLIANCE WITH ERAS PATHWAYS IN ELECTIVE COLORECTAL SURGERY.

P247

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Purpose/Background: Enhanced Recovery After Surgery (ERAS) encompasses several interventions aimed at optimizing outcomes in patients undergoing elective surgeries. These interventions may vary with the patient and type of surgery, but in all instances, it utilizes current evidence-based practices aimed at reducing intra and post-op complications with resultant decreases in mortality, length of stay (LOS), cost per case and readmissions. Adoption and compliance with ERAS protocols amongst nursing and housestaff has been variable. The goal of our study is to evaluate our outcomes after adopting an ERAS protocol in our elective colorectal surgery population, to evaluate our compliance with the pathway and to initiate an action plan to increase compliance among the treatment team.

Methods/Interventions: A comparison study was performed on two sets of patients who underwent elective colorectal surgery between October 1, 2016 and October 31, 2017. Group A consisted of 20 patients who were assigned the ERAS pathway and Group B was comprised 51 patients who underwent surgery without the ERAS clinical pathway. Populations of both groups were risk-adjusted, benchmarked and compared for mortality, complication, and readmission rates, as well as length of stay and cost per case. Actual (observed) and expected values were benchmarked against similar populations in a national database (Premier). Healthcare provider compliance with the ERAS pathway was measured using chart review and categorized as partial, full and non-compliance.

Results/Outcome(s): Overall, the ERAS population performed better than the non-ERAS population in LOS, 30-day readmissions, and cost per case (Figure 1). There was no difference in mortality between the two populations

(each at 0.00%; $p=0.962$). Interestingly, overall the rate of complications such as acute kidney injury, acid-base disturbances and dehydration were slightly higher in the ERAS group compared to the non-ERAS group (26.67% vs. 24.18%, $p=0.039$). Among those assigned to the ERAS pathway, 25% exhibited full compliance, 10% exhibited partial compliance and 65% exhibited non-compliance.

Conclusions/Discussion: ERAS clinical pathways may reduce LOS, 30-day readmission and cost per case without negatively impacting mortality among the elective colorectal surgery patients. Additional studies are required to delineate the cause of the increase in overall complications in patients on the pathway. Current compliance with initiation and continuation of the clinical pathway is poor and provides an opportunity to improve patient outcomes. A corrective education program is underway and its effects on compliance with the pathway will be available in May of 2019.

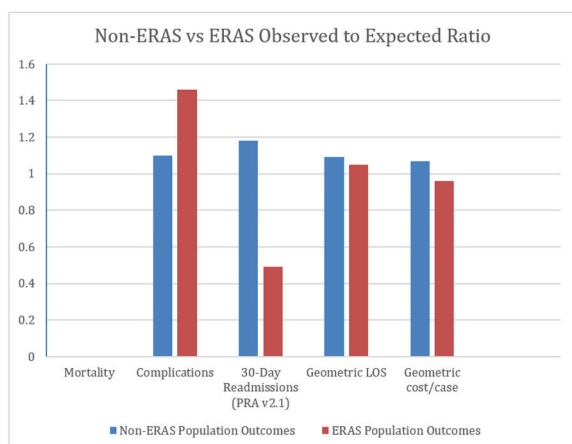


Figure 1: Comparison of Non-ERAS vs ERAS Population Observed to Expected Ratios

THE IMPACT OF OPIOIDS ON DELIRIUM AND OUTCOMES IN THE ELDERLY UNDERGOING COLORECTAL SURGERY.

P248

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Purpose/Background: A common and costly complication in elderly patients undergoing surgery is postoperative delirium. Despite known comorbidities and physiologic changes that may make render the elderly more sensitive to opioids, they remain ubiquitous for postoperative pain. Little work has been done to evaluate the relationship between the opioid dose and delirium on outcomes in this population. Our goal was to evaluate the relationship between opioid utilization, delirium, and quality outcomes in the elderly undergoing elective colorectal surgery.

Methods/Interventions: The Premier Database was reviewed for elderly patients (age 65 and greater) who

underwent colorectal resection from 1/1/2014-9/30/2015. Postoperative delirium was defined by using combination of ICD-9 codes, postoperative antipsychotics use, and having sitters and/or restraints after the day of surgery. All patients were evaluated for overall incidence of postoperative delirium and grouped by surgical approach (laparoscopic vs. open). Opioid use was stratified into 5 groups based on the distribution of total Morphine Milligram Equivalents (MME/stay) in the population (0, <50, 50-110, 111-250, >250). Univariate analysis compared demographics and outcomes in elderly colorectal surgery patients with and without postoperative delirium by MME. Multivariate analysis was used to evaluate the association between postoperative delirium, opioid MME, and quality outcomes of length of stay, readmissions, and costs (controlling for patient and hospital characteristics).

Results/Outcome(s): In the 24,430 elderly patients evaluated, the overall postoperative delirium incident rate was 10%. The incident rate of postoperative delirium was significantly lower with laparoscopic than open surgery (5.57% vs. 12.46%, $p<0.01$). Patients who had more opioid use (except MME>250) were more likely to develop postoperative delirium; this trend was seen across both approaches (Table 1). After controlling for surgical approach, patient and hospital characteristics, the regression analysis showed the likelihood of developing postoperative delirium increased directly with opioid dose (MME< 50: Odds Ratio [OR] 1.29, 95% CI [1.03-1.62, $p<0.01$]; MME 50-110: OR 1.45, 95% CI [1.15-1.82, $p<0.01$]; MME 110-250: OR 1.48, 95% CI [1.17-1.86, $p<0.01$]; MME>250: OR 1.60, 95% CI [1.27-2.01, $p<0.01$]). Quality outcomes for patients with postoperative delirium were also directly related to opioid use. The readmission risk increased with higher MME (MME 110-250: 1.26, 95% CI [1.032-1.531, $p=0.02$]; MME>250: OR 1.38, 95% CI [1.13, 1.69, $p<0.01$]). The length of stay increased directly with MME use- 9% for MME 50-110 (95% CI 1.07-1.16, $p<0.01$); 19% for MME 110-250 (95% CI 1.17-1.22, $p<0.01$), and 47% for MME>250 (95% CI 1.44-1.51, $p<0.01$)). The total costs increased directly with MME use (MME< 50: OR 1.04, 95% CI [1.02-1.05, $p<0.01$]; MME 50-110: OR 1.10, 95% CI [1.08-1.13, $p<0.01$]; MME 110-250: OR 1.17, 95% CI [1.14-1.20, $p<0.01$]; MME>250: OR 1.37, 95% CI [1.27-2.01, $p<0.01$]). For all outcomes, an open approach was associated with worse quality outcomes for postoperative delirium patients, with an increased risk of readmission (OR 1.287, 95% CI [1.17, 1.42], $p<0.01$), length of stay (OR 1.13, 95% CI [1.12, 1.14], $p<0.01$), and total costs (OR 1.03, 95% CI [1.02, 1.05], $p<0.01$) compared to a laparoscopic approach.

Conclusions/Discussion: Postoperative delirium occurred in 10% of elderly colorectal surgery patients, and significantly impacted postoperative outcomes. Opioid use was independently associated with postoperative delirium, with increasing opioid use directly related to increased

length of stay, readmission risk, and costs. For all metrics evaluated, a laparoscopic approach was associated with improved outcomes compared to the open approach. There is a need to improve surgical quality in the shift towards value-based care, as well as reducing opioids and their sequelae. As the elderly comprise the majority of colorectal cases performed, these results could have provided a new way to optimize outcomes, costs, and quality in this growing population.

Incidence of Postoperative Delirium with Total Opioid Usage by Approach—

Univariate and Multivariate Analysis

Type of Surgery	Laparoscopic				p-value	Open				p-value
	No		Yes			No		Yes		
Delirium	8,615	94.43%	508	5.57%		13,399	87.54%	1,908	12.46%	
Opioid dosage	N	%	N	%	0.0023	N	%	N	%	<0.0001
No opioid	641	96.97	20	3.03		819	89.90	92	10.10	
MME≤50	3427	94.88	185	5.12		3,915	89.08	480	10.92	
MME 50-110	2,006	94.13	125	5.87		3,073	88.30	407	11.70	
MME 110-250	1,660	93.89	108	6.11		3,162	87.54	450	12.46	
MME>250	881	92.64	70	7.36		2,430	83.53	479	16.47	

Multivariate Regression	Laparoscopic				p-value	Open			
	Adjusted OR	95%LCL	95%UCL	p-value		Adjusted OR	95%LCL	95%UCL	p-value
Opioid usage									
MME≤50	2.281	1.379	3.775	0.0013	1.112	0.861	1.436	0.4149	
MME 50-110	2.352	1.396	3.962	0.0013	1.27	0.982	1.643	0.0686	
MME 110-250	2.614	1.562	4.375	0.0003	1.265	0.976	1.639	0.0757	
MME>250	2.474	1.434	4.266	0.0011	1.42	1.097	1.839	0.0078	

LCL- Lower Confidence Limit, UCL- Upper Confidence Limit

CAN ERAS BE IMPLEMENTED IN A TERTIARY CARE CENTER WITH A LOW SOCIOECONOMIC POPULATION?

P249

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Purpose/Background: Enhanced Recovery After Surgery (ERAS) in patients undergoing colon and rectal surgeries has been shown to reduce morbidity and length of stay. Additional studies have shown that outcomes are related to compliance to the ERAS protocol. While many intraoperative and postoperative variables can be controlled by the provider, preoperative compliance relies on patient participation. According to the United States Census Bureau, 17.2 percent of the population in Kentucky is considered impoverished and the median household income is \$44,811. Twelve percent of the population is uninsured. The goal of this study is to assess the impact of socioeconomic status on implementation of preoperative ERAS measures.

Methods/Interventions: The American College of Surgeons National Surgical Quality Improvement Project (ACS-NSQIP) database was queried for all patients undergoing elective colectomy at the University of Kentucky from January through June 2017. Retrospective chart review was performed to gather demographic data. Telephone interviews were conducted to assess the financial impact of patient compliance to the ERAS protocol. Variables were compared by ERAS status. Statistical significance was set at $p \leq 0.05$

Results/Outcome(s): 117 patients undergoing elective colectomy or proctectomy were identified. 85 of these patients were placed on the ERAS protocol preoperatively.

Median age of non-ERAS patients was 52.5 whereas the median age of ERAS patients was 55.0 ($p = 0.419$). Gender ($p = 0.545$), race ($p = 0.327$) and employment status ($p = 0.957$) did not impact ERAS implementation. Overall, 67.5% of patients were from Appalachian counties. There was no significant difference in use of ERAS in this population ($p = 0.692$). Insurance status was associated with implementation of ERAS ($p = 0.05$). 25% of patients in the non-ERAS group had private insurance, 59.4% had Medicare, 6.2% had Medicaid and 9.4% were uninsured. 48.2% of patients in the ERAS group had private insurance, 44.7% had Medicare, 4.7% had Medicaid and 2.4% were uninsured.

Conclusions/Discussion: Greater than two thirds of patients undergoing elective colectomy or proctectomy in this study resided in Appalachia, a historically resource poor region of the United States. However, this did not impact assignment of patients to the ERAS protocol. Insurance status was predictive of initiation of ERAS, however, less than 50% of patients enrolled in ERAS had private insurance. Furthermore, telephone interviews suggest that despite socioeconomic barriers, patients were able to comply with preoperative tasks including preoperative glucose loading, antibiotic regimen, and nutritional optimization. Overall, this suggests that implementation of ERAS at a tertiary care referral center with a low socioeconomic population is possible.

POSTOPERATIVE MORBIDITY AND READMISSION RISK FOLLOWING ABDOMINOPERINEAL RESECTION: AN OPPORTUNITY FOR IMPROVEMENT.

P250

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Purpose/Background: Hospital readmissions represent a significant burden for both patients and the health-care system and is a key metric in measuring high-value, cost-conscious care. Patients undergoing an ostomy construction as part of their surgical treatment have a high risk for readmission although this observation is primarily based on patients undergoing a temporary diverting loop ileostomy. There is limited data on readmissions after an abdominoperineal resection (APR). Identifying modifiable associated factors in order to develop preventative strategies represents an important area of quality improvement. Our aim was to determine the incidence of readmission following APR and determine associated patient, disease, and treatment factors.

Methods/Interventions: Utilizing the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) Proctectomy Targeted Participant Use File (PUF) database, patients undergoing open or laparoscopic

abdominoperineal resections between 2016-2017 were identified utilizing CPT codes 45110 and 45395. Patient demographics, disease, treatment and operative variables were analyzed using univariate and multivariate analyses.

Results/Outcome(s): A total of 2,863 patients were identified with the following characteristics: median age 61 years (range 18-89), 58% males, BMI 27 (range 14-63), 19% smokers, and 66% had an ASA \geq 3. APR was performed by an open approach in 46%, laparoscopically in 26%, and robotically in 19% of patients. The most common indication was adenocarcinoma (73%) followed by inflammatory bowel disease (13%). The overall 30-day incidence of readmission after APR was 15.0% (n=430). After multivariate logistic regression analysis to account for available confounders, patient age, gender, comorbidities, diagnosis and operative approach were not associated with higher risk of 30-day readmission. However, shorter length of stay (LOS) (7.7 days vs. 8.5 days) and occurrence of postoperative complications including return to OR, surgical site infection (SSI), wound disruption, sepsis, clostridium difficile infection, renal insufficiency, myocardial infarction (MI), deep vein thrombosis (DVT), sepsis, and post-operative ileus were independently associated with readmissions (Table).

Conclusions/Discussion: A significant proportion of patients are readmitted following an APR within 30 days. Patient factors such as age, gender, comorbidities, diagnosis and operative approach are not associated with readmissions. However, patients developing postoperative complications have a higher probability of being readmitted and therefore represent an at-risk group. Quality improvement initiatives to decrease readmissions after APR should focus on preemptive interventions for patients developing complications as well as strategies to mitigate postoperative morbidity.

No. 2,863	Patient Complications Independently Associated with Readmission after APR		
	OR	95% CI	p value
Return to OR	2.47	1.56-3.90	< 0.001
SSI	8.02	6.07-10.60	< 0.001
Wound Disruption	7.63	4.10-14.20	< 0.001
Progressive Renal Insufficiency	5.48	1.87-16.05	0.002
MI	4.15	1.41-12.19	0.010
DVT	5.30	2.16-13.00	< 0.001
Sepsis	3.77	2.24-6.37	< 0.001
C. difficile infection	7.62	3.05-19.00	< 0.001
Post Operative Ileus	3.88	2.80-5.39	< 0.001

EFFECT OF PROPHYLACTIC TAMSULOSIN WITH EARLY URINARY CATHETER REMOVAL ON RATES OF URINARY RETENTION AFTER COLORECTAL SURGERY.

P251

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Purpose/Background: Urinary catheterization is routine for colorectal surgery. Prolonged catheterization after surgery is a risk factor for urinary tract infections (UTI) but early removal is also associated with increased urinary retention (UR). An alpha-1 adrenergic antagonist,

Tamsulosin, has been shown to reduce the incidence of UR after colorectal surgery. We assess the effect of early catheter removal (post-operative day two or sooner) plus perioperative Tamsulosin on UTI and UR.

Methods/Interventions: A retrospective cohort study of consecutive, elective colon and rectal resections in male patients 50 years or older from September 2014 to May 2018 at a single academic center was performed. History of benign prostate hypertrophy or prior prostate surgery, tumor extension to bladder or prostate and/or intraoperative urethral or bladder injury were excluded. As of 2016, Tamsulosin 0.4mg daily was given three days before surgery and continued until discharge. UR was defined as re-insertion of a urinary catheter or use of an in-and-out catheter in the postoperative period once the original catheter had been removed. UTI was defined using CDC criteria. A Chi-square comparison of UR and UTI rates between the pre-intervention (no tamsulosin) and post-intervention (prophylactic tamsulosin) groups was performed. Mean time to urinary catheter removal was compared using a Wilcoxon Rank Sum Test. A multivariate logistic regression was also performed to predict potential risk factors for UR.

Results/Outcome(s): 185 patients were included: 89 without and 96 with prophylactic Tamsulosin. There was no statistically significant difference between pre- and post-intervention groups in UR (15.7% vs. 8.3%, p=0.12) or UTI rate (6.8% vs. 2.1%, p=0.12). Mean time to catheter removal was longer in the pre-intervention group [2.9 days (+/- 1.8) vs 1.7 (+/-0.5), p<0.05]. Subgroup analysis was performed for colon versus rectal resections. For colon, UR was 8.8% (pre) vs. 4.3% (post), p=0.40 and UTI was 3.0% (pre) vs. 2.1% (post), p=0.80. For rectal, UR was 20.0% (pre) vs. 12.2% (post), p=0.29 and UTI was 9.1% (pre) vs. 2.0% (post), p=0.12. On multivariate logistic regression analysis, location (colon vs. rectal, p=0.04), UTI (p=0.002) and ileus (p=0.04) were found to be independent risk factors for UR. Age, prophylactic Tamsulosin and post-operative urinary catheter removal day were not.

Conclusions/Discussion: There was no statistically significant decrease in overall UR in colon and rectal surgery after prophylactic Tamsulosin, however there was a downward trend observed in overall as well as subgroup analysis for UR and UTI rates. Further study of more patients could prove statistical significance. UR decrease was more evident for rectal vs colon resection, however, it did not reach statistical significance. Overall UTI was low (2%) and did not change with prophylactic Tamsulosin and early catheter removal. Lesion location (colon vs. rectal), presence of UTI and ileus were found to be significant independent predictors of UR.

THE IMPACT OF TAP BLOCKS ON LENGTH OF STAY IN AN ERAS PROTOCOL.

P252

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Purpose/Background: Multimodal, narcotic-sparing analgesic strategies are an important part of the colorectal enhanced recovery systems of care. As part of that plan, regional anesthetics have proven to be superior to narcotics. This analysis addresses the impact of TAP blocks within an aggressive multimodal perioperative analgesic model.

Methods/Interventions: In this retrospective analysis, the records of 347 patients who underwent colorectal surgery between 2015-2016 were reviewed. The primary endpoints for this analysis were total LOS (in days) and total MME consumed during hospitalization. LOS and total MME were compared for patients who received a bilateral, single-injection TAP block versus patients that did not receive a TAP block.

Results/Outcome(s): A total of 347 patients underwent colorectal procedures under the ERAS protocol. Among these, 186 (54%) received a TAP block. Overall, the mean LOS was 5.8 days (SD \pm 5.6) and median LOS was 4 days. This compares to a mean LOS of 9.6 days and median LOS of 7 days prior to implementing the ERAS protocol. Patients who received a TAP block had a mean LOS of 5.1 days compared to 6.6 days for those who did not receive a TAP block ($p < 0.01$). Patients who received a TAP block consumed 736.5 MME of opioids compared to 1150.3 MME for those without a TAP block ($p < 0.05$), a 36% decrease in opioid use. When comparing patients who had a mean LOS of 4 days to those whose LOS was > 4 days, there was an 80% decrease in opioid use. The readmission rate was 7.8 %.

Conclusions/Discussion: Use of Abdominal wall block in the setting of a well-structured ERAS protocol resulted

in a statistically significant decrease in LOS by 1.5 days and it was associated with a 36% decrease in opioid narcotic use. TAP blocks are an effective strategy for improving pain and enhancing recovery.

EVALUATION OF QUALITY OUTCOMES FOR COMPLEX COLORECTAL SURGERY PATIENTS.

P253

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Purpose/Background: In efforts to enhance surgical quality and reduce the costs of care, postoperative readmissions and complications have become important performance metrics. Federal initiatives to improve these outcomes measures may impact provider reimbursement, with the consequence that providers are less keen to manage complex surgical patients. There is little study to date on the quality outcomes of surgical care in complex patients. Our goal was to evaluate the outcomes for elective colorectal surgery in complex patients.

Methods/Interventions: A prospectively maintained divisional database from a tertiary referral center was reviewed for consecutive complex patients undergoing elective colorectal surgery between 1/1/2013 and 6/1/2018. Complex patients were defined as age 80 years and greater, wound class 4, and/or American Society of Anesthesiologist (ASA) class III or greater that were underwent a colorectal resection via an abdominal approach. Patient demographics, disease specific characteristics, operative factors and postoperative outcome measures were evaluated. The main outcome measures were the length of stay (LOS), rates of overall and major (Clavien Class III and greater) complications, readmissions, reoperations, and mortality.

Results/Outcome(s): During the study period, 1,008 patients met inclusion criteria. The mean patient age was 63.0 years, the median ASA and wound class were III,

P252 Table 1

Factor (n)	Length of Stay (days)	P-value
Laparoscopic Surgery (80)	4.7	0.0335
Open Surgery (267)	6.1	
TAP Block (186)	5.1	0.0079
No TAP Block (161)	6.6	
Readmission (27)	6.7	0.8034
No Readmission (320)	5.7	
Immunonutrition (90)	4.96	0.014
No Immunonutrition (77)	6.06	
Carbohydrate Loading (45)	4.55	0.018
No Carbohydrate Loading (122)	5.81	
Surgical Site Infection (11)	7.8	0.8887
No Surgical Site Infection (336)	5.7	

and 58.43% had prior abdominal surgery. The primary diagnosis was colon cancer (n=363, 36.01%), and the main procedure performed a right hemicolectomy (n=236, 23.41%). The majority of patients had an anastomosis performed (78.57%), and almost half had surgery via a laparoscopic or robotic approach (49%). The rate of intraoperative complications was low (4.46%). Postoperatively, 31.55% experienced a complication, but only 9.13% were major complications. The mean LOS was 8.15 (SD 10.06) days, and the majority of patients were discharged to home (94.25%). The rates of readmission (15.38%), reoperation (7.54%), and mortality (3.07%) for our complex patient cohort was similar to published values for elective colorectal surgery outcomes in general.

Conclusions/Discussion: From our analysis, complex patients have acceptable quality outcomes after elective colorectal surgery. The LOS and overall complication rates are high, as expected in this high risk population, but the rates of serious complications, need for reintervention, and mortality parallel outcomes in normal-risk elective colorectal resection patients. With the impending changes in federal reimbursement and the shift to value based care, our results provide important evidence on the performance outcomes and healthcare utilization for managing complex patients.

Descriptive Statistics for Complex Patients (n = 1008)	
Preoperative Demographics	
Gender- Male/ Female (n, %)	521 (51.7%)/ 487 (48.3%)
Mean Age (years, SD)	63.0 (17.1)
Mean Body Mass Index (kg/m ² , SD)	26.7 (6.27)
Median ASA Class (Range)	3 (2-4)
Prior Abdominal Surgery (n, %)	589 (58.43%)
Mean Preoperative Albumin (g/dL, SD)	3.77 (0.74)
Preoperative Chemoradiation (n, %)	48 (4.76%)
Preoperative Steroids (n, %)	80 (7.74%)
Intraoperative	
Laparoscopic Approach (n, %)	494 (49.01%)
Anastomosis Performed (n, %)	792 (78.57%)
Intraoperative Transfusion	101 (10.02%)
Drain Placed Intraoperatively	185 (18.35%)
Mean Estimated Blood Loss (mL, SD)	184.07 (365.50)
Intraoperative Complications (n, %)	45 (4.46%)
Postoperative	
Overall Postoperative Complications (n, %)	318 (31.55%)
Major Postoperative Complications (n, %)	92 (9.13%)
Mean Length of Stay (days, SD)	8.15 (10.06)
Readmissions (n, %)	155 (15.38%)
Reoperations (n, %)	76 (7.54%)
Mortality (n, %)	31 (3.07%)
Discharge Disposition (n, %)	
Home	950 (94.25%)
Rehabilitation/ Skilled Nursing Facility	39 (3.87%)
Hospice	2 (<1.00%)

USE OF C-REACTIVE PROTEIN (CRP) AS PREDICTIVE MARKER IN DETECTING COLORECTAL ANASTOMOTIC LEAKS: IS IT RELIABLE?

P254

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Purpose/Background: Anastomotic leaks after colorectal surgery is associated with serious morbidity and mortality rates and early diagnosis is critical. C-reactive protein (CRP) on postoperative day 3 to 5 have been described as a good predictor of anastomotic leak. Previous meta-analysis showed that CRP cut-off values of 172mg/l on POD3, 124mg/l on POD4 and 144mg/l on POD5 corresponded to negative predictive value of 97% for anastomotic leak. This study aims to review the correlation of current CRP cut-off values and anastomotic leak and whether CRP can be relied on with high predictive value in ruling out anastomotic leaks.

Methods/Interventions: From 1 January 2011 to 30 June 2018, patients who had anastomotic leaks after colorectal surgery at Department of Colorectal Surgery, Singapore General Hospital were analysed retrospectively. Patients who did not have any CRP levels performed from POD 3 to 5 were excluded.

Results/Outcome(s): Out of 56 patients who had anastomotic leaks, only 28 had CRP levels performed from POD3 to 5. The median age was 66 years (range 20 to 92 years). 14 underwent an anterior resection, 4 had right hemicolectomy, 3 had a left hemicolectomy, 3 had reversal of ileostomy or colostomy, 4 had subtotal or total colectomy. 10 (36%) were laparoscopic resections and 20 (71%) were performed for colorectal malignancy. Only 1 patient had pre-operative chemotherapy. No patients were on long term steroids or immunosuppressed. 10 (36%) had prior abdominal surgery. 17 (60%) were diagnosed with anastomotic leak 1-week post-op. 26 (93%) required surgical intervention for the anastomotic leak. Using the earlier mentioned established cut-off values to predict anastomotic leaks, 8 (29%) patients did not have a raised CRP from POD 3 to 5 but still developed an anastomotic leak. Among these 8 patients, 2 had CRP on POD3 only, 1 had CRP on POD5 only and 5 of them had CRP performed on both POD3 and 4. Among these 8 patients, the range of the CRP levels on POD3 was 29.9 to 153mg/l; on POD4 was 14.7 to 105mg/l and on POD5 was 20.2 to 124mg/l.

Conclusions/Discussion: Early detection of anastomotic leaks can minimize postoperative complications and morbidity rates. Although use of CRP is a useful negative predictive test for anastomotic leaks, this case series demonstrate that the current cut-off values have to be reviewed to better predict anastomotic leaks.

ALVIMOPAN USE IN THE SETTING OF ABDOMINOPERINEAL RESECTION: A RETROSPECTIVE COHORT STUDY.

P255

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Purpose/Background: Alvimopan is a peripherally acting u-opioid antagonist designed to reverse opioid-induced side effects on gastrointestinal function without compromise of pain relief. It is indicated for patients undergoing bowel resection with primary anastomosis and has been demonstrated to reduce length of stay and cost after colon resection surgeries. Alvimopan is commonly included in institutional enhanced recovery protocols, thus some patients receive the drug after abdominoperineal resection (APR) despite a lack of bowel anastomosis. Our study aims to evaluate the clinical impact of alvimopan in patients undergoing APR in a national cohort.

Methods/Interventions: This was a retrospective cohort study of data from a national administrative database. Using ICD-9 and ICD-10 codes, we queried the Vizient Clinical Database for all patients undergoing laparoscopic and open APR between 1/1/2015 and 06/30/2017. Patients were stratified into laparoscopic and open procedures for descriptive statistics. The association between alvimopan use and other variables was assessed with Chi-square and Kruskal-Wallis tests. Multivariate linear regression was performed with length of stay (LOS) as primary outcome of interest.

Results/Outcome(s): Of the 1070 patients who met inclusion criteria, 711 (66.4%) underwent open and 359 (33.6%) underwent laparoscopic APR. Alvimopan was given to 181 (16.9%) total patients and overall was associated with increased median LOS (6.0 vs 5.0 days, $p < 0.01$). In the open APR group, 106 (14.9%) received alvimopan, which was associated with increased median LOS (6.5 vs 5.0 days, $p < 0.01$). After adjusting for comorbidities using the Elixhauser comorbidity index, multivariate linear regression demonstrated LOS was increased by 44% (effect ratio 1.44, $p < 0.01$) in open APR patients receiving alvimopan. In patients undergoing laparoscopic APR, 75 (20.9%) received alvimopan with no change in median LOS (5.0 vs 5.0 days, $p = 0.04$). After adjusting for comorbidities, LOS for patients receiving alvimopan in the laparoscopic APR group was decreased by 13% (effect ratio 0.87, $p = 0.07$), though this did not meet statistical significance.

Conclusions/Discussion: The use of alvimopan in the setting of APR fails to demonstrate significant reduction in LOS for patients, and was associated with increased LOS in patients undergoing open APR. It is possible that the findings in the open APR group were confounded by diversity of the patient population, as these patients are more likely to undergo complex procedures, such as flap

reconstruction or pelvic exenteration, that may contribute to increased length of stay. A randomized controlled trial may be warranted to evaluate if alvimopan provides benefit to patients undergoing APR.

LUNG METASTASIS IN NEWLY DIAGNOSED COLORECTAL CANCER: A POPULATION-BASED STUDY.

P256

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Purpose/Background: Colorectal cancer (CRC) with lung metastasis is not uncommon. The present study is aimed to explore risk factors and survival of patients with lung metastasis of CRC.

Methods/Interventions: Patients with CRC and lung metastasis were identified using the surveillance, epidemiology, and end results (SEER) database. We identified a sample of 134126 patients diagnosed with CRC between 2010 and 2015. Multivariable logistic regression was performed to identify factors predicting the occurrence of lung metastasis at the time of diagnosis, and Kaplan-Meier and cox analysis were used to compare survivals.

Results/Outcome(s): Altogether 7074 CRC patients were identified as having lung metastasis at the time of diagnosis, accounting for 5.274% of the entire cohort and 30.85% of the IV CRC cases. The mean survival of the entire cohort with lung metastasis was 17.5 months, and the 1-, 3- and 5-year survival rate was 49.9%, 14.4% and 5.4%, respectively. Multivariable logistic regression analysis showed that high CEA level ($p < 0.01$), low T stage ($p < 0.01$), N+ stage ($p < 0.01$), liver metastasis ($p < 0.01$), bone metastasis ($p < 0.01$), brain metastasis ($p < 0.01$), rectal cancer ($p < 0.01$), and the white race ($p < 0.01$) were associated with significantly greater odds of having lung metastasis at the time of diagnosis of CRC. On multivariable cox regression analysis among patients with only lung metastasis high CEA level ($p < 0.01$), high T stage ($p < 0.01$), N+ stage ($p < 0.01$), poor differentiation ($p < 0.01$), young age ($p < 0.01$) were associated with poor prognosis of CRC.

Conclusions/Discussion: This study provides a population-based estimate of the predictors and prognosis of patients with lung metastasis at time of diagnosis of CRC. Patients diagnosed with rectal cancer have a high incidence of lung metastasis. For patients with only lung metastasis and primary cancer resection, young age, high local stage, poor differentiation and high CEA were independent risk factors for poor prognosis.

COMPARATIVE STUDY OF 2D CONVENTIONAL ARGUMENTED CT VERSUS 3D VASCULAR RECONSTRUCTION FOR VESSELS EVALUATION BEFORE RIGHT HEMICOLECTOMY.

P257

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Purpose/Background: Laparoscopic D3 radical right hemicolectomy has been gradually promoted and applied in colorectal surgery. 3D vascular reconstruction of the superior mesenteric vein is usually applied before right hemicolectomy in clinical practice, with a satisfactory effect. However, 3D vascular reconstruction is expensive and requires a long appointment time. The aim of our study is to compare whether 2D conventional argumented CT and 3D vascular reconstruction has the same evaluation effect.

Methods/Interventions: Preoperative imaging data of 50 patients with right colon cancer who were examined on the same CT system in Changhai Hospital from January to September 2018 were analyzed retrospectively. All data were reconstructed by both 2D imaging reconstruction and 3D vascular reconstruction, and then observed and interpreted independently by the senior imaging doctors and colorectal surgeons of two different groups. The observational parameters included the GTH anatomy type, length of GTH, length between the root of GTH and ileocolic vein (GTH-ICV), and the positional relationship between the root of ICV and ileocolic vein (ICA). we used kappa coefficient to measure the agreement between the types of GTH observed in 2D and 3D. Pearson coefficients were estimated to indicate the correlations between the lengths of GTH (or the lengths between the root of GTH and ICV) measured in 2D and 3D. Bland-Altman method was used to assess the agreement of quantitative data.

Results/Outcome(s): GTH could be classified into type 0-III according to the number of the colon veins that enter the GTH. 2D conventional argumented CT showed that GTH was present in 86% of the 50 patients, including 4.7% type 0, 48.8% type I, 39.5% type II, and 6.9% type III. 3D vascular imaging showed that GTH was present in 88% of the 50 patients, including 13.6% type 0, 43.2% type I, 36.4% type II, and 6.8% type III. The agreement rate of the positional relationship between the root of ICV and ICA in 2D and 3D was 100%. The kappa coefficient between the GTH types observed in 2D and 3D was 0.830, 95%CI was (0.705, 0.956). The Pearson coefficient was 0.872 in terms of the length of GTH, and 0.979 in terms of GTH-ICV in 2D vs. 3D. Bland-Altman method indicated that both length of GTH and GTH-ICV had a relatively high agreement between 2D and 3D.

Conclusions/Discussion: Our data analysis indicates that 2D conventional argumented CT and 3D vascular reconstruction have the same evaluation effect before right hemicolectomy. The advantages of 2D conventional argumented CT include the short reconstruction time and low cost.

TUMOR DEPOSITS AND DISTAL TUMOR SPREAD IN RECTAL CANCER.

P258

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Purpose/Background: Tumor deposits (TD) and distal tumor spread (DTS) are known adverse prognostic factors in rectal cancer and correlate with advanced stage disease. The prevalence of these adverse histopathological factors varies, and similarly, impact of neoadjuvant therapy on both TD and DTS is unclear. This knowledge would be important because of its impact on the minimum acceptable distal margin. The objective of this study was to assess the prevalence and location of TD and DTS as well as the impact of neoadjuvant therapy on these adverse histopathological factors in patients who underwent proctectomy for rectal cancer in order to help guide decisions about minimum acceptable distal margins.

Methods/Interventions: Our pathology database was queried for patients who underwent proctectomy with curative intent for rectal cancer from January 2008 to December 2015. All specimens with TD and DTS were re-evaluated by a single, expert rectal cancer pathologist to verify the diagnosis and to measure the distance to the distal margin of resection. Outcomes measures: 3 years overall survival and disease-free survival.

Results/Outcome(s): A total of 275 consecutive patients were identified. 38 (14%) specimens contained TD. DTS distal to the distal margin of the tumor was found in 13 (4%) specimens as shown in Table 1. In clinical stage 2, 7 (7.6%) specimens contained TD but none contained DTS and there was no statistically significant difference between patients who received or did not receive neoadjuvant chemoradiotherapy (NACRT). Clinical stage 3 patients received full dose pre-operative NACRT in 109/111 patients. In this group, 30 (27%) specimens contained TD. DTS was found in 13 (11%) specimens, 6 (5%) showed intra-mural DTS, and 7(6%) extra-mural DTS. The length of DTS from the distal end of the tumor ranged between 0-30 mm, while only in 4 (3% of stage 3, 1% of the total cohort) specimens the length was greater than 10 mm. Positive distal resection margin was found in 5 (1.8%) specimens, all of them in clinically stage 3 patients who received NACRT.

Conclusions/Discussion: A macroscopically tumor-free margin should suffice in patients with stage 1 or 2 disease. Furthermore, a 1.0 cm margin is adequate in patients with stage 3 disease.

**CYTOREDUCTIVE SURGERY AND
HYPERThERMIC INTRAPERITONEAL
CHEMOTHERAPY IN APPENDICEAL AND
COLORECTAL NEOPLASMS: OUTCOMES AND
SURVIVAL.**

P259

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Purpose/Background: Cytoreductive surgery (CRS) and hypethermic peritoneal chemotherapy (HIPEC) has survival benefit for patients with appendiceal and colorectal stage IV neoplasms. The aim of this study was to review the outcomes following CRS/HIPEC for patients with appendiceal or colorectal neoplasms and evaluate key prognostic indicators that may guide treatment.

Methods/Interventions: An IRB approved database was reviewed from November 2009 to February 2018 for patient demographics, operative report, and postoperative outcomes. Univariate and multivariate logistic regression analysis was done to determine any prognostic factors for survival following CRS/HIPEC for appendiceal and colorectal neoplasms.

Results/Outcome(s): 110 consecutive patients of a median age of 54.5 (range, 18-79) years underwent CRS/HIPEC for colorectal and appendix neoplasms. Primary tumor location was colorectal in 58 (52.7%) cases and appendiceal in 52 (47.3%). 31 patients (28.2%) had right sided tumors, 1 (0.9%) in the left colon, 14 (12.7%) in the sigmoid, and 13 (11.8%) in the rectum. 12/13 patients with rectal cancer were preoperatively treated with radiation. Mean PCI score was 9.6 ± 7.7 ; complete cytoreduction (CC 0-1) was achieved in 90.9% of HIPEC procedures. Overall, 59 patients (53.6%) developed postoperative complications, the most common of which

was ileus (33.6%); 18% grade I (Clavien-Dindo), 24.5% grade II, and 9.1% grade III. Three patients developed anastomotic leak (2.7%). Reoperation rate was 1.8% and perioperative mortality rate was 0.9% (n = 1). The rate of 30-day readmission was 13.6%, mainly due to small bowel obstruction. Overall mortality rate was 29.1% (n = 32); there was no in-hospital mortality. Recurrence rate was 48.2%, with a mean time to recurrence of 11.1 months. Overall survival at 1 and 2 years after CRS/HIPEC was 80% and 56.8%, and disease event-free survival was 60.8% and 33.7%, respectively, at a median follow-up of 16.8 (range, 0-86.8) months. Univariate analysis of preoperative chemotherapy, primary malignancy location, primary perforated or obstructive neoplasm, postoperative bleeding complication, as well as pathology of adenocarcinoma, mucinous adenocarcinoma, and negative lymph nodes were identified as possible predictive factors with influence over survival. Multivariate logistic regression analysis showed that preoperative chemotherapy (OR 4.677, 95% CI: 12.020 – 10.828; p<0.001), perforated neoplasm (OR 0.242, 95% CI: 0.094 – 0.6197; p=0.003), and postoperative intra-abdominal bleeding (OR 165.813, 95% CI: 12.377 - 2221.454; p<0.001) were independent prognostic indicators for survival after CRS/HIPEC for appendiceal and colorectal neoplasms.

Conclusions/Discussion: CRS and HIPEC for colorectal and appendiceal neoplasms had a low mortality and high completeness of the cytoreduction score. Preoperative chemotherapy, primary tumor perforation, and postoperative bleeding are adverse risk factors for survival in CRS/HIPEC.

P258 Table 1. Specimens contained DTS

Patient #	Tumor location	cStage	CRT	pT	pN	pStage	Additional TD	Extramural/ intramural	Distance from tumor (mm)	Distance from distal margin (mm)
1	High	3	Yes	3	2	3		Extra	3	35
2	Low	3	Yes	4	2	3	Yes	Intra	15	0
3	Mid	3	Yes	3	1	3		Intra	30	0
4	Low	3	Yes	3	1	3		Extra	5	25
5	Mid	3	Yes	2	2	3	Yes	Extra	3	5
6	Mid	3	Yes	3	1	3	Yes	Extra	2	13
7	Low	3	Yes	3	1	3		Extra	11	60
8	Mid	3	Yes	3	2	3	Yes	Extra	6	31
9	Mid	3	Yes	3	0	3	Yes	Intra	0	0
10	Mid	3	Yes	2	2	3	Yes	Extra	13	20
11	Low	3	Yes	3	1	3	Yes	Intra	9	29
12	Low	3	Yes	3	2	3	Yes	Intra	8	10
13	Low	3	Yes	3	0	3	Yes	Intra	5	10

A NOVEL METHOD FOR ANVIL PLACEMENT DURING LAPAROSCOPIC RESECTION OF MIDDLE OR UPPER RECTAL CANCER WITH TRANSRECTAL SPECIMEN EXTRACTION SURGERY.

P260

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Purpose/Background: To introduce a novel method for anvil placement during laparoscopic resection of middle or upper rectal cancer with transrectal specimen extraction.

Methods/Interventions: A retrospective analysis was performed using the data of 48 patients with upper rectal or sigmoid colon cancer, who had undergone laparoscopic resection with natural orifice specimen extraction surgery involving a novel method of anvil placement at the Department of Colorectal Surgery, Shanghai East Hospital, Tongji University, between June 2015 and May 2017. The surgical indications were as follows: (1) rectal or sigmoid colon cancer, with a distance of >6 cm between the inferior border of the tumour and the dentate line; (2) a maximum intestinal diameter of <7 cm, including the mesentery and tumour, determined intra-operatively; (3) no history of anorectal stenosis or lack of expansion capacity caused by surgery for the anal canal or distal rectal carcinoma, or trauma; and (4) no ulcerative colitis, Crohn's disease, or radiation proctitis in the intestinal canal distal to the tumour. Among the patients included in the study, 30 were men and 18 were women. The mean patient age was 64.5 ± 14.1 years, mean body mass index was 25.4 ± 3.9 kg/m², tumour diameter was 3.3 ± 1.1 cm, maximum specimen diameter was 5.4 ± 1.5 cm, and specimen length was 18.6 ± 4.3 cm. After rectal transection, a self-made specimen protection sleeve was inserted through the 12-mm primary trocar on the right lower abdomen, and the rear end of the sleeve was pulled out through the rectum and anus. The anvil was inserted through the protection sleeve, and the resected specimen was removed in an antegrade fashion through the rectum and anus. The closed edge of the proximal rectal stump was cut off. After local disinfection, the anvil was introduced and a snare was used to fix the colon wall annularly onto the centre rod of the anvil. Finally, excess tissue was cut away and end-to-end anastomosis was performed with a stapler.

Results/Outcome(s): Among the 48 cases included in the study, traditional small-incision abdominal surgery for specimen removal and intestinal reconstruction had to be performed in 1 case owing to the large specimen volume (combined diameter of tumour and mesentery = 7.5 cm). The overall mean operative time was 113.2 ± 76.1 min, intraoperative blood loss was 38.5 ± 17.3 mL, time to first oral intake of liquid food was 47.9 ± 4.4 h, and length of post-operative hospitalisation was 8.5 ± 1.7 days. Post-operative fever occurred in 2 cases (4.2%), and post-operative anastomotic fistula occurred in 1 case (2.1%). None of the

patients experienced intra-abdominal infection, trocar site infection, or intestinal obstruction.

Conclusions/Discussion: This novel method for anvil placement can effectively reduce the risk of intra-abdominal contamination and tumour cell shedding.

ROLE OF PROGNOSTIC NUTRITIONAL INDEX IN RECTAL CANCER PATIENTS WHO RECEIVE NEO-ADJUVANT CHEMORADIOTHERAPY: DOES IS REALLY PREDICT TREATMENT RESPONSE AND OUTCOME?

P261

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Purpose/Background: Malnutrition can adversely affect treatment responses and oncological outcomes in cancer patients. However, the role of nutritional indicators like PNI as predictors of treatment response and outcome remains unclear among patients with rectal cancer who undergo neoadjuvant chemoradiotherapy (NACRT). We planned this retrospective study with the aim of determining whether the peri-treatment calculated Prognostic Nutritional Index (PNI) can be used as a predictor of treatment response and outcomes in patients with rectal cancer undergoing NACRT

Methods/Interventions: We did a retrospective analysis of a prospectively maintained database of rectal cancer patients who underwent surgery following NACRT. Variables studied are Pre- NACTRT PNI, Post NACTRT PNI and its impact on tumour response, subjective global assessment, nodal status, recurrence, disease free and overall survival. PNI was calculated by using formula $(PNI - 10 * \text{serum albumin (g/dl)} + 0.005 * \text{total lymphocyte count (per mm}^3))$

Results/Outcome(s): 115 patients with rectal cancer received NACRT followed by Abdominoperineal resection (APR) in approximately 45 per cent of cases, followed by Anterior resection, Low anterior resection, Total pelvic exenteration at our institution between January 2013 to January 2014. The median age of presentation was around 46 years. Most of the cases were locally advanced rectal cancer at presentation. Using Wilcoxon Signed Ranks Median Pre-NACTRT PNI was 42.47 and median post-NACTRT PNI was 40.60 which is statistically significant. There is no significant statistical impact of PNI with subjective global assessment (SGA), tumour regression grade (TRG), nodal positivity, recurrence, disease-free survival (DFS) and overall survival (OS). There is no statistical significance of aggressive nutritional rehabilitation on PNI of cancer patients treated in 2017 compared to patients treated in 2013

Conclusions/Discussion: This study confirms NACTRT has a negative impact on Prognostic Nutrition

Index (PNI) in rectal cancer patients and also did not show any significant association with treatment response and outcomes in rectal cancer patients. Standard nutritional supplementation did not affect the PNI score and outcomes in rectal cancer patients. However, the role of immunonutrition cannot be ignored.

SURGICAL RESECTION OF LOCOREGIONALLY RECURRENT COLON CANCER: RESULTS FROM TWO LARGE TERTIARY REFERRAL CENTERS IN THE USA AND UK.

P262

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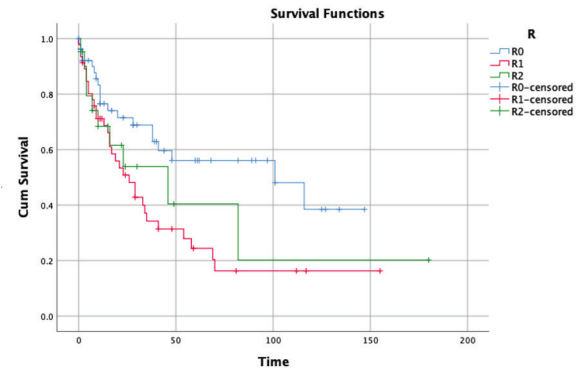
Purpose/Background: Locoregional recurrence of colon cancer (LRRCC) includes anastomotic, intra-abdominal, abdominal wall and pelvic disease, and occurs in up to 5% of patients who have undergone a curative primary resection. Unlike recurrent rectal cancer, there is a paucity of published data on outcomes for colon cancer. We aimed to examine these outcomes for patients undergoing resection at two specialist centers to provide guidance on management.

Methods/Interventions: Patients undergoing resection of LRRCC with curative intent were identified from prospectively maintained databases in the both centers. Data were collected regarding demographics, primary and recurrent surgery details and clinical outcomes. Disease found to be R2 intra-operatively were included to enable real-world pre-operative predictions of outcomes. Survival analysis was performed using the Kaplan-Meier method with log rank testing to compare differences between survival curves.

Results/Outcome(s): One hundred and thirty-three patients (78 USA, 55 UK; 62 men; median age 60 (range 30-88) years) were included. The site of recurrence was peri-anastomotic in 49.6% (n=66), intra-abdominal or abdominal wall in 19.5% (n=26), and pelvic 'drop metastases' in 30.8% (n=41). R0 resection was obtained in 44.8% (n=56), R1 in 37.6% (n=47) and R2 in 17.6% (n=22). Three and five year survival were 46% and 23% for R0 resection, compared to 29% and 14% for R1 resection. On survival curve analysis, median survival was significantly greater in R0 resections (84.3 vs 46.0 months, $P=0.021$, see figure). Patients with anastomotic and abdominal recurrences had similar median survival (75.4 and 76.9 months) but pelvic LRCC ('drop metastases') had a poorer median survival (52.5 months, $P=0.047$).

Conclusions/Discussion: This is the largest published series of outcomes following resection for LRCC and demonstrates that good outcomes are possible when planning surgery with curative intent. R0 resection and

non-pelvic recurrence site demonstrated a statistically significant survival advantage in the studied patient cohort.



LAPAROSCOPY AS A USEFUL ADJUNCT TO COLONOSCOPIC POLYPECTOMY: A CASE SERIES.

P263

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Purpose/Background: Difficult polyps comprise approximately 10-15% of all polyps and tend to have characteristics unfavorable to endoscopic resection such as large size, flat profile or location behind haustral folds. Laparoscopic assisted colonoscopic polypectomy (LACP) is a technique in which patients undergo laparoscopy as an adjunct to endoscopy to perform mucosal resection of a colonic polyp and this has been shown to be successful in several studies. Laparoscopy can help flatten folds, mobilize flexures and provide retraction for favorable polyp exposure during colonoscopy. Additionally, LACP benefits patients by helping to avoid the morbidity and length of stay associated with segmental colectomy. We present a case series of four patients that underwent LACP and support the role of this technique when faced with a difficult colonic polyp.

Methods/Interventions: A series of four patients who underwent LACP performed by a single colorectal surgeon at The Jewish Hospital (Cincinnati, OH) from November 2017 to September 2018 were reviewed. LACP was pursued in patients with a polyp that was unable to be resected with standard endoscopic technique due to anatomic location, size or difficult morphology during colonoscopy. The surgeon performed colonoscopy and polypectomy while a general surgery resident assisted with manipulation of the bowel via laparoscopy. Polypectomy was performed with hot snare and hemostasis achieved with endoscopic clips if necessary. Patients were discharged same-day and follow up colonoscopy was performed between as early as 7 months post LACP.

Results/Outcome(s): Complete LACP was successful in three of four patients (75%) (Table 1). One patient required conversion to laparoscopic segmental resection due to size and polyp morphology that was highly suspicion

for malignancy. Of the three patients who underwent completion of LACP pathology confirmed one tubular adenoma, one tubulovillous adenoma, and one villoglandular adenoma. Pathology from the segmental colectomy showed a microscopic focus of invasive adenocarcinoma within a tubulovillous adenoma. Two of three (66%) patients that underwent successful LACP were discharged home same-day and one patient was discharged home on post-op day one. Follow up colonoscopy for one patient who underwent successful LACP showed recurrence of the polyp, which lead to subsequent laparoscopic segmental resection. Pathology from resection showed villoglandular adenoma indeterminate of high grade dysplasia with no evidence of malignancy. The remaining two patients who underwent successful LACP are scheduled for follow up colonoscopy at 5 months.

Conclusions/Discussion: Difficult colon polyps present a unique challenge to the most experienced endoscopist. As stated previously, large size, flat profile, and unfavorable location make endoscopic polypectomy challenging. Failure of endoscopic polypectomy typically results in segmental colon resection, which is the standard of care. However, there are combined laparoendoscopic techniques that may help to prevent segmental colon resection. The combined laparoendoscopic technique for removal of difficult colon polyps was first described by Beck in 1993. There have been multiple subsequent case series that describe the use of this combined technique for the

removal of technically challenging colon polyps. An advantage of this technique is direct visualization of the colon during endoscopic resection, which allows the surgeon to identify full thickness burns or perforations and address these complications promptly. This prevents patients from presenting in the outpatient setting with potentially highly morbid complications. This procedure typically requires an experienced surgeon to perform laparoscopy while an endoscopist performs a colonoscopy. In our experience a surgical resident has been adept to perform laparoscopy while an attending surgeon performs colonoscopic resection. This differs from previous reports that required surgical and gastroenterologic services present for the procedure. Our case series is also unique to the current literature in that median length of stay for our patients has been <1 day. We have had one case of conversion to laparoscopic segmental colectomy and one case of recurrence, which led to laparoscopic segmental colectomy. We did not perform intraoperative frozen section in our patients. Current literature demonstrates a high false negative rate with intraoperative frozen section. We acknowledge that our case series is too underpowered to suggest that LACP be the standard of care in technically unresectable colonic polyps; however, we do support the idea that LACP should be in the armamentarium of every surgeon with endoscopic experience prior to segmental colonic resection in patients with difficult polyps.

P263 Patient demographics and polyp characteristics

Age/Sex	Morphology	Location	Clips	CLSCR	Pathology	HGD	Malignancy	LOS (days)	Prognosis	Complications
50/M	Flat	Terminal ileum	Yes	No	Tubular adenoma	No	No	<1	Surveillance colonoscopy scheduled	None
50/M	Pedunculated	Ascending colon	Yes	No	Tubulovillous adenoma	Yes	No	<1	Surveillance colonoscopy scheduled	None
82/M	Sessile	Splenic flexure	No	Yes, left hemicolectomy	Adenocarcinoma	Yes	Yes	15	19 negative LNs. Follow up colonoscopy scheduled for 1 year	Ileus
66/F	Sessile	Cecum	No	No	Tubular adenoma	No	No	<1	Recurrence at 7 months. Right hemicolectomy at 9 months.	None

This table demonstrates colon polyp characteristics including location, morphology and final pathology, as well as the procedures performed, and outcomes for patients undergoing laparoscopic assisted colonoscopic polypectomy. M (male); F (female); CLSCR (conversion to laparoscopic assisted segmental colon resection); HGD (high grade dysplasia); LOS (length of stay); LNs (Lymph Nodes).

ROBOTIC PELVIC EXENTERATION: EXPERIENCE FROM AN EXENTERATION UNIT AND SYSTEMATIC REVIEW.

P264

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Purpose/Background: Pelvic Exenteration remains a viable and effective treatment option for the management of locally advanced or recurrent pelvic malignancy. Technological advances in robotics may facilitate more advanced minimally invasive surgery. This study aims to present an early experience of robotic pelvic exenteration and compare it to a systematic review of the literature.

Methods/Interventions: All patients undergoing robotic-assisted pelvic exenteration including rectal resection at two tertiary colorectal centres were identified from a prospective database and data attained from the database and chart review. Patient demographic data included age, gender, pathology, ASA grade, preoperative tumor staging, presence of prior or neoadjuvant radiation treatment, and whether there was any history of prior abdominal surgery or not was collected. Peri/post-operative data included type of operation performed, presence or absence of primary anastomosis, total operating time, transfusion requirements, post-operative intensive care and analgesia requirements, hospital length of stay, complication rates, operative lymph node harvest, R0 resection status, and when applicable, recurrence rates at 18 months follow up. A systematic review of the literature for robotic exenteration was undertaken using the search terms 'robotic' and 'pelvic exenteration' to identify publications from the PubMed, EMBASE, and the Cochrane database electronic search engines. Inclusion criteria for further analysis was limited to articles that; reported specifically in relation to 'robotic' surgery as opposed to other forms of minimally-invasive surgery; involved more than single 'anterior compartment' exenteration; and involved a multivisceral excision of at least 2 separate organs, of which one of these must at least involve a bowel resection as part of the procedure.

Results/Outcome(s): Eight patients (6 male, 2 female; median age 56 years, range 29-83) underwent robot pelvic exenteration between January 2016 and September 2018. All cases were performed for primary locally advanced pelvic malignancy, 6 (75%) for locally advanced rectal cancer, and 2 for extracapsular prostate cancer. All patients had undergone preoperative neoadjuvant radiotherapy. Surgery was undertaken using a Di Vinci Robotic Surgical System (Intuitive Surgical, Sunnyvale, CA, USA) Xi model (3 cases), Si (4 cases), or S (1 case). The mean total operating time was 8.3hrs (range 6.0-10.0). Perioperative blood transfusion was required in 25% of

patients. Five patients (63%) had ICU stays of one day only, and 7 (88%) had their post-operative PCA requirements ceased by day 3. Average hospital length of stay was 15 days (range 7-26). There was no mortality and complications were reported in 4 patients, the majority associated with ileus and delayed return of GI function. There were no instances of post-operative haemorrhage, organ dysfunction, return to theatre, deep pelvic collection, or other serious morbidity. Median time (in days) to stoma activity was 3 (range 1-8). All patients had clear margins on histological assessment and no patients have recurrence at 12 months follow up. Eight papers comprising 43 patients were identified from a systematic review of the literature. The majority of patients in the systematic review underwent pelvic exenteration for either primary rectal or prostate cancer. Complications occurred in 9 of the total 43 patients, representing an overall complication rate of 21%, and perioperative blood transfusions were only required in 4 cases (9.3%). Average operating times between the studies ranged from 4.0 to 10.2 hrs. Hospital length of stay was also quite variable, ranging from 8 to 37 days. Forty patients overall (93% of all patients) achieved R0 resection status.

Conclusions/Discussion: Robotic pelvic exenteration is a safe and feasible minimally invasive approach to exenteration in highly selected cases.

MINIMALLY INVASIVE MULTIVISCERAL RESECTION OF T4B COLORECTAL CANCER – A SINGLE-INSTITUTION EXPERIENCE.

P265

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Purpose/Background: There is minimal data on the use of minimally invasive surgery (MIS) i.e. laparoscopic and robotic, for multivisceral resection (MVR) of T4b colorectal cancer. These high-risk colorectal cancers have normally been excluded from studies comparing MIS to open surgery. We compared the short-term operative outcomes, and long-term oncological outcomes between open, laparoscopic and robotic multivisceral en-bloc resection of T4b colorectal cancer.

Methods/Interventions: Retrospective review of patients with pT4b colorectal cancer, with or without distant metastatic disease, who underwent resection from 2007 to 2017. The study was conducted at a single institution. They were divided into 3 groups of open, laparoscopic and robotic. Main outcome measures were oncological outcomes of R0 resection rate, disease-free survival (DFS), and overall survival (OS). Secondary outcome measures were the rate of morbidity and mortality within 30 post-operative days.

Results/Outcome(s): A total of 95 patients with pT4b colorectal cancer were included. Open surgery was performed on 31 patients, laparoscopic surgery on 44 patients, and robotic surgery on 20 patients. The MIS groups had patients in worse clinical stage ($p<0.05$). Patients in all 3 groups have a statistically similar distribution of primary disease ($p=0.468$), and non-statistically different distribution of adjacent visceral involvement ($p=0.557$). Robotic surgery took significantly longer operative time ($p<0.05$), but MIS overall had less average blood loss ($p<0.05$), and blood transfusion requirement ($p<0.05$), with similar rate of morbidity ($p=0.461$) and mortality ($p=0.483$) within 30 postoperative days, when compared with open surgery. With regards to oncological outcomes,

the three groups had a similar rate of R0 resection ($p=0.290$), with statistically comparable DFS ($p=0.496$), and OS ($p=0.832$). Otherwise, robotic surgery showed a trend towards a less postoperative length of stay, and total hospital stay. The follow-up time was 30 ± 25.7 months in the open group, 28 ± 28.5 months in the laparoscopic group, and 27.5 ± 26.5 in the robotic group ($p=0.927$).

Conclusions/Discussion: This study has the largest number of T4b colorectal cancer comparing the outcome of MIS against open surgery. This study has shown that minimally invasive surgeries were equally safe and feasible and should be considered as an upfront approach for multi-visceral resection of T4b colorectal cancer, with comparable oncological and operative outcomes.

P265 Operative outcome

Operative outcome	Open	Laparoscopic	Robotic	p-value
Organ resected - colon	21	35	2	< 0.05
Organ resected - Rectum	10	9	18	
Emergency procedure	3 (9.7%)	1 (2.3%)	0 (0%)	0.256
Palliative resection	18 (58.1%)	18 (40.9%)	1 (5%)	< 0.05
Conversion to open	-	10 (22.7%)	0 (0%)	< 0.05
Median operation duration (min)	315 (IQR 218 - 450)	248.5 (IQR 197.75 - 300)	425 (IQR 283.75 - 507.5)	< 0.05
Average blood loss (mL)	632.3	118.2	277.5	< 0.05
Received blood transfusion	11 (35.5%)	5 (11.4%)	5 (25%)	< 0.05
Median tumour size (cm)	8 (IQR 5 - 9.3)	6.5 (IQR 5 - 9)	6 (IQR 4 - 6.95)	p < 0.05
R0 resection rate				
Colon R0	19	36	2	0.591
Colon R1	2	1	0	
Rectum R0	10	7	16	0.698
Rectum R1	0	0	2	
Involved Resection Margin				
Proximal	0	0	0	1
Distal	0	0	0	1
Circumferential	0	0	2	< 0.05
Postoperative outcomes				
Overall postoperative complication within 30 days	18 (58.1%)	19 (43.2%)	10 (50%)	0.461
Anastomotic leakage	1 (3.2%)	0 (0%)	1 (5%)	0.286
Intraabdominal/ Pelvic abscess	3 (9.7%)	1 (2.3%)	0 (0%)	0.256
Ileus	10 (32.3%)	11 (25%)	3 (15%)	0.395
Chyle ascites	0 (0%)	3 (6.8%)	3 (15%)	0.069
Urinary retention	4 (12.9%)	4 (9.1%)	3 (15%)	0.768
Mortality in 30 days	0 (0%)	1 (2.3%)	1 (5%)	0.483
Return of bowel action, median (days)	3	3	2	0.801
Median postoperative length of stay (days)	17 (IQR 12 - 37)	12 (IQR 8 - 19.5)	13 (IQR 8.25 - 25.5)	0.224
Mean follow-up (months)	30 +/- 25.7	28 +/- 28.5	27.5 +/- 26.5	0.927

COMPLETE MESOCOLIC EXCISION AND EXTENDED LYMPH NODE DISSECTION FOR RIGHT COLON CANCER: A SINGLE-CENTRE EXPERIENCE.

P266

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Purpose/Background: Hohenberger et al. (2009) introduced the concept of Complete Mesocolic Excision (CME) as the curative treatment for colon cancer. There are many proponents to CME and central vessel ligation (D3), in order to improve lymph node harvest and provide a more accurate nodal staging. Potential benefits of performing extended lymphadenectomy (D3) are complete removal of the tumour bearing lymph nodes and removal of potential 'skip' lymph node metastasis. Approximately 3% to 5% of right colonic tumours metastasize to central mesocolic lymph nodes. The drawbacks of performing CME and D3 dissection are the challenge in performing the procedure using minimally invasive surgery, leading to longer operative time, and particularly even more challenging in obese patients. We presented the short-term operative outcomes and long-term oncological outcomes of minimally invasive surgery (MIS) approach for CME and D3 dissection for colon cancer.

Methods/Interventions: Retrospective review of patients with colon cancer, with or without distant metastatic disease, who underwent CME and D3 dissection from 2007 to 2017. The study was conducted at a single institution. Main outcome measures were oncological outcomes of R0 resection rate and lymph node harvest. Secondary outcome measures were the rate of specific intraoperative complication i.e. duodenal injury, pancreatitis, SMV thrombosis, or any major vascular injury, and morbidity and mortality within 30 postoperative days.

Results/Outcome(s): A total of 711 MIS CME and D3 dissections were performed for colon cancer at our institution. 694 MIS were performed laparoscopically, and 17 MIS were performed robotically. The median pT stage was T3 and pN stage of N0. The rate of R0 resection was 99.5%, with no involved proximal, distal or circumferential resection margin. Median lymph node harvest was 29 (IQR 21 - 40). Median operating time was 155 minutes (IQR 130 - 195 minutes) for the laparoscopic group and 280 minutes (IQR 237.5 - 315 minutes) for the robotic group. Average blood loss was 380mls, with 48 patients (6.75%) had blood transfusions. No specific intraoperative complications occurred. Majority of the morbidity was related to ileus (6.05%), anastomotic leak (2.8%), and wound infection (2.1%). Median postoperative length of stay was 12 days (IQR 8 - 19.5 days). The mean follow-up time was 28 ± 28.5 months. 99 patients (13.9%), had disease recurrence in 5 years. Median survival was 42 months (IQR 16.9 - 69.5 months).

Conclusions/Discussion: This study has the largest number of MIS CME and D3 dissection for colon cancer. This study has shown that MIS was safe and feasible

in experienced hands, and should be considered as the upfront approach for CME and D3 dissection for colon cancer, with good oncological and operative outcome. With better lymph node harvest, we can potentially better approximate the nodal staging for these patients.

SARCOPENIA IS A RISK FACTOR FOR READMISSION AND SURGICAL COMPLICATIONS IN ABDOMINAL OPERATIONS FOR COLON AND RECTAL CANCER.

P267

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Purpose/Background: Cancer is often a disease of the elderly. Sarcopenia is the age-related decrease in muscle mass from that seen in younger, healthy adults. Older patients with sarcopenia are known to have longer lengths of stay and increased infection rates after surgery. We present a retrospective analysis in colon and rectal cancer patients from a single institution assessing the relationship between sarcopenia, surgical complications, and readmission.

Methods/Interventions: This study uses a retrospectively collected database of colon and rectal cancer surgical patients at a single institution from June 2018 to November 2018. A total of 38 patients were identified, with 24 patients having available preoperative or perioperative imaging for analysis. Imaging analysis was done by a single author (KT) using the Phillips iSite imaging software. Cross sectional area of skeletal muscle groups was determined at the level of L3 vertebrae. Hounsfield units used to verify muscle density were -30 to 110. The skeletal muscle index (SMI) was calculated using the cross-sectional area in centimeters squared divided by the height in meters squared ($SMI = \text{cm}^2/\text{m}^2$). Sarcopenia was defined from the literature based on thresholds previously linked to colon and rectal cancer mortality, with males with BMI < 25 defined as sarcopenic with SMI < 43, males with BMI > 25 defined as SMI < 53, and females defined as sarcopenic with SMI < 41 regardless of BMI (Martin et al. J Clin Oncol. 2013). With small sample sizes, variables were all assumed to have non-parametric distribution. Categorical variables were compared using Fisher's Exact Test. Mann-Whitney U Test was used to compare quantitative and ordinal variables.

Results/Outcome(s): In our cohort, there were 24 patients with images available for analysis. Out of these patients, 10 were defined by our cutoffs as having sarcopenia. These patients were more likely to be female 8/10 ($p = 0.0069$) and older, with median age of 68.5 in the sarcopenia group and 56 in the non-sarcopenia group ($p = 0.0306$). There were no statistically significant differences in preoperative ASA scores, preoperative albumin

(means 3.5 and 3.95 respectively), or in the number undergoing open surgery. Length of stay trended toward longer in the group with sarcopenia (8 days vs 4 days, $p=0.7661$) but did not reach statistical significance. The 30 day readmission rate was higher in the sarcopenia group than the non-sarcopenia group (50% vs 7%, $p=0.0278$), and the 30 day complication rate for all complications was higher (60% vs 14%, $p=0.0284$).

Conclusions/Discussion: Sarcopenia is a risk factor for complications and readmissions in patients undergoing abdominal surgery for colon and rectal cancer. This is independent of morbidity as indicated by ASA score but is associated with increased age. Limitations of our study include the small sample size and the large number of patients without available imaging for analysis in the iSite system, since many of the patients had outside images. With most colon and rectal cancer patients having preoperative imaging and the ease with which this analysis can be performed on commonly available software platforms, skeletal muscle index scoring is useful as a predictor of patients at high risk for complications and readmissions.

COLORECTAL ANGIOSARCOMA: A RARE AND DEADLY DISEASE.

P268

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Purpose/Background: Angiosarcomas are extremely rare malignancies of the vascular epithelium associated with a poor prognosis. These tumors most commonly affect the skin and superficial soft tissues of the head and neck, but can be found anywhere in the body. The presence of angiosarcomas in the colon and rectum is unique,

accounting for less than 0.001% of all colorectal malignancies. Due to their infrequent presentation, there are few cases in the literature and little knowledge has been gained since the disease was first reported in 1932. The purpose of this study was to investigate a single-institutional experience of colorectal angiosarcoma and to consolidate the literature to improve diagnosis and management.

Methods/Interventions: Patients with a diagnosis of colorectal angiosarcoma were selected from an IRB-approved National Comprehensive Cancer Center pathology database, which contains all reported anatomic pathology reports from 1985 to 2018. Thirty-six patients were identified using key words “angiosarcoma AND colon,” “angiosarcoma AND rectum,” and “angiosarcoma AND anus.” Of these, seven patients had a diagnosis of angiosarcoma supported by hematoxylin and eosin staining. An eighth patient was included in the institutional series, for whom data was obtained via direct clinical interaction. Data from this population of patients were pooled with data obtained from a comprehensive literature search that was performed by two independent reviewers. Statistical analysis included descriptive statistics, survival analyses, and Chi-square test with Yates correction when appropriate.

Results/Outcome(s): Of the eight patients whose data were reviewed at this institution, only one had complete patient demographics, diagnostic work-up, and treatment information. This 70 year-old female presented with abdominal pain, rectal bleeding, and tenesmus. An abdominal/pelvic CT scan showed hepatic cysts and a 3.7 x 3.2 cm lobular heterogeneous soft tissue mass in the rectosigmoid junction. A large mass was seen 11 cm from the anal verge on flexible sigmoidoscopy; however, the tumor was unable to be biopsied. A low anterior resection with partial small bowel resection was performed, and final pathology returned as colorectal angiosarcoma. The patient received

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Patient characteristics:	Sarcopenic	Non-sarcopenic	p=
Male	2/10	11/14	0.0069
Median Age (Range)	68.5 (50-86)	56 (43-80)	0.0306
Open Surgery	3/10	3/14	0.4943
ASA Score: Median (Range)	3 (2-4)	3 (2-3)	0.0615
Cancer Stage: Median (Range)	3 (1-3)	2 (1-3)	0.3906
Albumin: Median (Range)	3.5 (2.9-4.3)	3.95 (3.2-4.6)	0.1637
Hypoalbuminemia (<3.5 g/dL)	3/9	2/12	0.3529
Rectal Cancer	2/10	1/14	0.3706
Colon Cancer	8/10	13/14	0.3706
Outcomes:	Sarcopenic	Non sarcopenic	p=
30 day readmission	5/10	1/14	0.0278
30 day complication:	6/10	2/14	0.0284
Non-home discharge	1/10	0/14	0.4167
Length of Stay: Median (Range)	8 (2-24)	4 (2-10)	0.7661

adjuvant chemotherapy. At 17 months post-operatively, CT, MRI and endoscopy showed no evidence of recurrence. An extensive literature search revealed 39 published case studies (40 patients) discussing primary colorectal angiosarcoma. Our institutional series identified 8 patients, producing a total of 48 patients. Tumor locations involved the cecum (22.9%, N = 11), ascending colon (4.1%, N = 2), sigmoid colon (35.4%, N = 17), rectum (29.2%, N = 14), multicentric (2.0%, N = 1), and unspecified colorectal location (6.3%, N = 3). The majority of the studies reported age, gender, and treatment modality. Of these patients, 55% (N = 26) were female. The average patient age was 60.5 years old with a range of 16 to 92 years. Most patients were diagnosed using a combination of methods, of which endoscopy (colonoscopy or flexible sigmoidoscopy; 73.9%) and abdominal CT (52.2%) were the most common. Surgery was the most utilized treatment modality, with 93.5% (N = 43) of patients undergoing surgery and 23.9% (N = 11) utilizing adjuvant chemotherapy or radiotherapy. In general, patients diagnosed with angiosarcoma had a very poor prognosis. Of the studies that evaluated survival, 52.9% (N = 18), had a mean survival time of 7 months. Factors predictive of a poor outcome included old age, tumor size, and the presence of metastases, positive lymph nodes, or tumor recurrence. From the 29 case studies that evaluated survival rates, patients older than 50 had a survival rate of 26.3%, compared to patients under 50 who had a survival rate of 60% ($p < 0.01$). The survival rate analyzed in patients reporting metastases, positive lymph nodes, or tumor recurrence was 28.6% (N = 6), compared to a 1-year disease-free survival rate of 100% ($p < 0.05$) in patients with no reported metastases or recurrence. Survival was further analyzed after stratifying by tumor size in 26 patients. Patients with tumors greater than 5 cm in diameter had a 33.3% survival rate, compared to a 57.1% survival rate ($p = 0.001$) among patients with tumors less than 5 cm in diameter.

Conclusions/Discussion: Colorectal angiosarcoma is an extremely aggressive and rare malignancy that can be difficult to diagnose prior to surgery. Surgery is currently the most common treatment modality, though the role of adjuvant chemotherapy and radiation treatment remains unclear. Small tumor size, young age, and absence of metastatic disease or recurrence appear to be the factors most predictive of improved outcomes.

THE FINDING OF INVASIVE CANCER IN PATIENTS THOUGHT TO HAVE LARGE SESSILE ADENOMAS WHO ARE EVALUATED FOR ENDOSCOPIC SUBMUCOSAL DISSECTION (ESD) AND/OR ENDOSCOPIC MUCOSAL RESECTION (EMR) IN THE OR SETTING: INCIDENCE AND CHARACTERISTICS.

P269

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Purpose/Background: Despite prior biopsies suggesting that a large sessile polyp is a benign adenoma or, at worst, contains high grade dysplasia (HGD), the final pathologic analysis after ESD, EMR, or segmental resection may reveal invasive adenocarcinoma. This review of patients sent for consideration for ESD/EMR with a final diagnosis of invasive cancer was undertaken to determine the characteristics of the polyp cancers as well as the endoscopic or surgical treatment(s) rendered.

Methods/Interventions: An IRB approved prospective data base of large polyp patients sent for ESD/EMR to be done by a surgical endoscopist in the OR setting (with MIS "wedge" partial circumference or segmental resection as backup treatments) was reviewed. Hospital, office, operative, and pathology records were reviewed. The index lesion's location, preoperative diagnosis, and treatment(s) were noted as were the frozen section and final pathology results.

Results/Outcome(s): A total of 117 polyp patients (pts) with adenomas were sent for ESD/EMR consideration. Final pathology revealed 17 invasive adenocarcinomas (14.5%). The stage breakdown was: stage 1, 11 pts; stage 2, 1; stage 3, 4; and T1 Nx, 1 pt (refused colectomy). The polyp locations in the cancer subgroup were: right, 8 (47%); transverse, 3 (18%); sigmoid, 5 (29%); rectum, 1 (0.6%). As regards the overall group (117), the preop diagnosis was adenoma without HGD in 100 patients; 11 had a final diagnosis of invasive cancer (cancer incidence=11%). In 17/117 pts the preop diagnosis was HGD; invasive cancer was found in 6 HGD pts (cancer incidence=35.3%). In 27 pts the polyp would not fully lift when injected; the incidence of cancer in this group was 14.8% (4/27). Of note, on endoscopic inspection, in 7/17 pts a cancer was strongly suspected such that bowel wall injection was not carried out. As regards treatment; 11/17 underwent immediate colectomy without ESD/EMR; 5 underwent successful ESD/EMR (frozen section showed adenoma +/- dysplasia) and 1 had a colectomy after failed ESD/EMR attempt. Four of 5 successful ESD/EMR pts underwent subsequent colectomy (cancer found in 1).

Conclusions/Discussion: Overall, 14.5% of pts sent for ESD/EMR evaluation were found to have invasive cancer. The cancer incidence of cancer was notably higher in pts with HGD (35.3%) vs those with adenomas (11%).

In the majority invasive cancer was not suspected; 60% underwent ESD/EMR and was completed in 5/6. Frozen section analysis detected 0/6 cancers. MD's should know that 14.5% of patients with supposedly benign large polyps will prove to have invasive cancers, thus ESD/EMR is not appropriate for all. Also, HGD polyps are high risk. Doing ESD/EMR in the OR setting allows for immediate colectomy under the same bowel prep and anesthesia. Also, the authors acknowledge that they need to learn and utilize the surface inspection diagnostic methods used in Japan.

THE IMPACT OF EX VIVO PORCINE AND BOVINE ENDOSCOPIC SUBMUCOSAL DISSECTION (ESD) TRAINING ON A CLINICAL COLORECTAL ESD/ENDOSCOPIC MUCOSAL RESECTION (EMR) POLYP PROGRAM'S SUCCESS RATE.

P270

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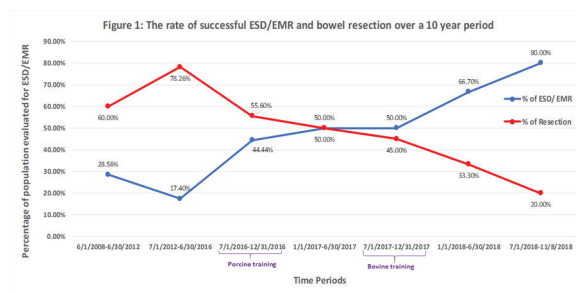
Purpose/Background: ESD is the gold standard for large sessile benign colorectal adenomas yet most these lesions in the US are removed via segmental colectomy. One reason for the low adoption rate is that ESD requires a hard to obtain skill set. Whereas standard cold biopsy forceps and snare polypectomy are carried out with the scope tip stationary, in ESD, tissue is cut only when the scope tip is moving with a hot needle knife extended from its tip. The risk of perforation in the thin walled colon is high. In Japan endoscopists must do 40-60 gastric ESD prior to attempting colonic cases. Due to low gastric case volume this is not an option in the US. An alternative is to substitute 40-60 ex vivo porcine stomach and bovine colonic ESD cases done with equipment dedicated to training purposes. Unlike the clinical setting, with ex vivo models it is possible to gain considerable case experience over a relatively short period of time (4-6 months). The authors, long interested in ESD and EMR, have employed such a program and here present the clinical impact of such training as regards one surgical endoscopist.

Methods/Interventions: An IRB approved large polyp program has been in place for 10 years. Colonoscopic removal via ESD +/- EMR methods (+ laparoscopy after to inspect bowel wall) in the OR is the goal; laparoscopic "wedge" partial circumference resection or segmental resection are carried out immediately if ESD/EMR polypectomy fails, a cancer is suspected, the polyp is located at the appendiceal orifice or ileocecal valve, or the lesion is judged otherwise not suitable for endoscopic removal. For the first 7.5 years ESD experience was obtained solely by doing human cases. From July-November 2016, 24 ex vivo porcine stomach ESD cases were done using a hollow plastic tube with window cutout over which a rectangular

piece of full thickness stomach and then a bovey pad was placed. A sponge with a slit at one end of the tube serves as anus. The basic ESD steps can be learned in this setting; importantly cases can be finished despite mid case perforation due to the plastic tube model. From July-December 2017, 22 ex vivo bovine colon (intact colon, rectum, and anus) ESD cases were carried out. The 2.5-3.5 foot long colon is anchored via rubber bands on a peg board in the desired shape and the proximal end clamped. Tattooed lesions are removed using standard ESD technique. In this model perforation results in loss of operative field but external sutures can close the hole and the case can be completed. The ESD/EMR success rate and the colectomy rate for the successive time periods were determined.

Results/Outcome(s): A total of 120 patients were evaluated in the OR for ESD/EMR. Seven time periods were studied: 7/1/08-6/30/12 (35 cases, ESD/ EMR- 28.56%, resection-60%); 7/1/12- 6/30/16 (23 cases, ESD/ EMR- 17.40%, resection-78.26%); 7/1/16-12/31/16 (9 cases, ESD/ EMR- 44.4%, resection- 55.6%); 1/1/17-6/30/17 (10 cases, ESD/ EMR-50%, resection-50%); 7/1/17-12/31/17 (20 cases, ESD/ EMR- 50%, resection- 45%); 1/1/18-6/30/18 (9 cases, ESD/ EMR- 66.7%, 33.3%); 7/1/18-11/15/18 (15 cases, ESD/ EMR-80%, resection-20%). Figure 1 shows the colectomy and ESD/EMR success rates for each time period. The ESD/EMR success rate remained < 50 % and the colectomy rate > 50% for the first 8 years, however, after the ex vivo porcine and bovine training periods a steady increase in the ESD/EMR success rate (80% presently) and a concomitant drop in the colectomy rate (to 20%) was noted.

Conclusions/Discussion: There is an association between the ex vivo tissue training programs and an increase in the ESR/EMR completion rate. It is speculated that the performance of many complete ex vivo ESD cases in a relatively short period of time allowed the surgeon to gain the skills needed for ESD in the clinical setting. The ex-vivo porcine and bovine training models warrant further evaluation and may provide a safe means of obtaining the unique scope tip control skills needed for ESD.



NEOADJUVANT CHEMO-RADIATION VERSUS ADJUVANT CHEMOTHERAPY FOR LOCALLY ADVANCED ADENOCARCINOMA OF THE RECTOSIGMOID JUNCTION.

P271

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Purpose/Background: Neoadjuvant chemo-radiation (NCR) and adjuvant chemotherapy (AC) are considered standard of care for locally advanced rectal and colon adenocarcinoma, respectively. However, the optimal treatment approach for adenocarcinoma of the rectosigmoid junction remains unclear. Objective was to compare outcomes of NCR and AC for cancer of the rectosigmoid junction.

Methods/Interventions: All patients who underwent curative-intent resection for locally advanced (AJCC stages II & III) adenocarcinoma of the rectosigmoid junction were included. Exclusion criteria were age <18 & >75 years, Charlson-Deyo score >2, AJCC stages I, IV, and un-staged tumors. Interventions were treatment with NCR versus AC. The primary outcome was poor perioperative outcome (PPO), a composite of 30-day readmission and/or mortality. Other endpoints were resection margin status, the presence of lympho-vascular invasion, and overall survival.

Results/Outcome(s): A total of 2,840 patients were included in this study [1,701 (59.8%) received NCR]. NCR was more frequently utilized in patients who were black (10.3% vs 7.6%), male (73% vs. 59.2%), and treated at academic institutions (37.9 vs. 22.5%) [$p < 0.05$ for all]. After risk-adjustment, NCR was associated with a higher risk for PPO (OR: 1.39, CI: 1.05 – 1.87; $p = 0.022$). Treatment with NCR was independently associated with a decreased likelihood for positive resection margins (OR: 0.43, CI: 0.32 – 0.56; $p < 0.001$) and lympho-vascular invasion (OR: 0.51, CI: 0.39 – 0.66; $p < 0.001$). However, this did not confer any survival benefit (HR: 1.21, CI: 1.01 – 1.44; $p = 0.037$).

Conclusions/Discussion: NCR is currently more frequently utilized than AC for the management of locally advanced adenocarcinoma of the rectosigmoid junction. This approach may not be justified as NCR is associated with a higher risk of PPO and poor long-term survival when compared to AC. Prospective studies are warranted to definitively compare outcomes of NCR and AC in this patient population.

KAPOSI'S SARCOMA PRESENTING AS RECTAL BLEEDING: A CASE REPORT.

P272

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Purpose/Background: Kaposi's sarcoma is well known to be associated with human immunodeficiency virus (HIV) disease. We present a patient in whom Kaposi's was diagnosed during colonoscopy for evaluation of rectal bleeding. HIV was diagnosed after Kaposi's was found.

Methods/Interventions: Case presentation and review of the literature.

Results/Outcome(s): Patient's diagnosis of Kaposi's lead to diagnosis of HIV. With highly active antiretroviral therapy (HAART), his symptom's resolved and his follow-up colonoscopy showed resolution of his Kaposi's sarcoma.

Conclusions/Discussion: The patient is a forty-two year old man who presented to the office with six months of intermittent pain with bowel movements and associated bleeding. His exam was only notable for non-bleeding/inflamed internal hemorrhoids with an anal papilla on the posterior lateral location. He was instructed to increase the fiber in his diet and apply a topical nifedipine cream for a likely anal fissure. He has a family history of colon cancer and subsequently underwent a colonoscopy. The colonoscopy was more notable for erythematous polyps in the hepatic flexure, sigmoid, and rectum. Each of these were biopsied. The pathology of each was Kaposi's sarcoma. His metastatic workup with a positron emission tomography (PET) scan suggested the primary source to be the rectum and he had no other distal lesions. It was only at this time did the patient find out that he was HIV positive with an acquired immunodeficiency syndrome (AIDS) defining lesion. After consultation with oncology, his treatment regimen was HAART. After 3 months of treatment, he had a repeat colonoscopy to look for disease remission. It revealed that the colon involvement had resolved but persistent lesions were seen in the rectum. He remained on HAART therapy alone and at 6 months of treatment his repeat endoscopy showed no residual disease. Kaposi's sarcoma is a vascular neoplasm caused by infection with human herpesvirus 8 (HHV8), also known as Kaposi's sarcoma-associated herpesvirus. Kaposi's sarcoma most typically affects the skin, but involvement of the oral cavity, gastrointestinal and respiratory tracts is common. Gastrointestinal tract involvement occurs most commonly in patients with altered immunity including transplant recipients and those with HIV infection. Treatment is dependent on the severity of disease. Patients with limited or advanced Kaposi's sarcoma, recommended treatment includes HAART. For some patients, like ours, HAART alone may be sufficient to induce regression of the Kaposi's sarcoma. Some patient will require HAART and radiotherapy plus local or systemic chemotherapy.

Indications for systemic chemotherapy include extensive cutaneous disease, systemic visceral involvement, and cutaneous lesions that are unresponsive to local therapy. Chemotherapy is also indicated for patients with immune reconstitution inflammatory syndrome, which is a progressive Kaposi's sarcoma, within weeks after initiating HARRT. Therefore close monitoring of the lesion with endoscopy was necessary to document progression and eventually remission.



Endoscopic image of Kaposi's sarcoma in the rectum

A COMPARATIVE ANALYSIS OF MINIMAL INVASIVE APPROACH AND CONVENTIONAL OPEN SURGERY FOR PELVIC EXENTERATION IN LOCALLY ADVANCED COLORECTAL CANCER.

P273

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Purpose/Background: Pelvic exenteration (PE) is indicated to achieve R0 resection in locally advanced and locally recurrent colorectal cancer (CRC). Minimally invasive surgery (MIS) for PE is not well established. Only few studies with small case series and heterogeneous disease subtypes have been described and compared only short-term outcomes. The aim was to assess the safety and feasibility of MIS (laparoscopic and robotic) for PE in locally advanced CRC and to compare perioperative and long-term outcomes with conventional open surgery.

Methods/Interventions: This was a retrospective analysis of prospectively collected data. All consecutive patients who underwent PE for colorectal adenocarcinoma from May 2013 to July 2018 were included. The short-term outcomes like perioperative details, histo-pathological characteristics and long-term outcomes like disease free survival (DFS) were compared between two groups. The comparison was made by the Chi-squared test or the Mann-Whitney U test, where appropriate.

Results/Outcome(s): The open PE was performed in 91 patients and the MIS in 24 patients. A total of 14 patients underwent laparoscopic total PE and 2 patients underwent laparoscopic posterior exenteration. Robotic total PE was performed in 4 patients and 4 patients underwent robotic posterior exenteration. Three patients underwent supralevator exenteration and 13 patients underwent lateral pelvic lymph node dissection in MIS group. The mean BMI in MIS group was 23.03 kg/m². The perioperative details are shown in Table 1. The operative time was more and intraoperative blood loss was less for MIS. The postoperative stay, complication rate and histopathological characteristics were comparable in both the groups (Table 1). At a median follow up of 13.6 months (1-75 months), the estimated 2 year DFS was 73.5% in MIS group and 61% in OPE, which was comparable.

Conclusions/Discussion: MIS is feasible and safe for total PE and posterior exenteration in locally advanced CRC. An R0 resection with adequate margin can be achieved in MIS. There is a less intraoperative blood loss in MIS. Long-term oncological outcomes are good and will require further follow up to confirm.

PELVIC INLET RECTAL CANCER: IS THERE A NEED FOR NEO-ADJUVANT RADIATION?

P274

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Purpose/Background: Pelvic inlet rectal cancer (PIRC) specifically refers to recto-sigmoid and upper rectal tumors. They behave differently due to proximity to the anterior peritoneal reflection (APR) owing to which there is early peritoneal and urinary bladder involvement. There are no defined treatment guidelines to support the use of Neo-adjuvant Radiotherapy (NART) in these tumors. Not many studies have looked if NART has any short term or long term outcome advantage. Role of NART in PIRC needs to be defined.

Methods/Interventions: A retrospective analysis of prospectively maintained data was performed at a tertiary cancer centre in the Indian subcontinent. All consecutive patients who received curative treatment for adenocarcinoma PIRC, stage T3/T4 and node positive disease from January 2014 to December 2017 were included in the study. Depending on whether NART was used, the patients were categorized into Upfront Surgery (Sx) and NART arms. Both short-term and long-term outcomes were analyzed.

Results/Outcome(s): A total of 130 patients were included in the study, 75 patients (57.7%) in Sx-arm and 55 patients (42.3%) in NART-arm. The demographic and disease characteristics were comparable in both the groups. The median follow up (FU) was 29 months. There was no

difference in the circumferential resection margin (CRM) and distal resection margin (DRM) positivity rate. The median lymph node harvest was significantly higher in Sx-arm, 19 vs 12 ($p < 0.0001$). Covering stoma rate was lower in Sx-arm (85.4% vs 40%, $p < 0.0001$). Sx-arm experienced greater anastomotic leak rates as compared to NART-arm (5.3% vs 1.8%, $p = 0.053$). The rate of major complications (Clavien Dindo, CD grade III and above) was significantly higher in Sx-arm as compared to NART-arm (8% vs 1.8%, $p = 0.042$) and this included one death in the postoperative period following an anastomotic leak. Intra-operative blood loss and hospital stay were similar in both the groups. Three-year disease free survival (DFS) was similar in both the groups ($p = 0.973$). There was no difference in 3-year overall survival (OS) ($p = 0.939$).

Conclusions/Discussion: Role of NART in PIRC remains undefined without any long term oncological advantage. However, the major complication rate following

NART is lower. NART in PIRC can be considered selectively in T4 disease where there is a trend towards improved outcomes. This calls for the need for further studies evaluating the role of NART in PIRC.

DO WE NEED RADICAL SURGERY FOR CLINICALLY EARLY STAGE OF RIGHT SIDE COLON CANCER? A RETROSPECTIVE REVIEW OF CLINICAL STAGE I.

P275

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Purpose/Background: Radical lymph node dissection for right side colon cancer is technically challenging. No clear guideline is present for surgical resection of early clinical stage right side colon cancer. This study was designed

P273 Table 1: Perioperative details

Perioperative details	MIS (n= 24)	Open (n=91)	P value
Duration Surgery (min), mean (range)	647 (420-800)	462 (180-800)	0.00
Blood loss, (mL), median	900 (300-2600)	1700 (150-11000)	0.00
Blood transfused (mL), median (range)	178 (0-1200)	300 (0-3800)	0.007
Hospital stay (days), median (range)	11.5 (7-42)	12 (5-94)	0.609
Conversion to open	01	-	-
Complications (%)	14 (58.3)	48 (52.7)	0.625
Clavien Dindo (CD) grade (%)	-	-	-
CD II	08 (33.34)	29 (31.86)	
CD IIIa	03 (12.5)	07 (8.8)	0.969
CD IIIb and IV	03 (12.5)	11 (12.08)	
CD V	0	01 (1.09)	
Readmission in 30 days (%)	3 (12.5)	10 (11.0)	1.00
Resection type (%)	-	-	-
R0	20 (83.33)	79 (86.82)	0.487
R1 (CRM involved)	4 (16.67)	12 (13.18)	
pT stage (%)	-	-	-
pT4a	2 (8.33)	5 (10.9)	0.698
pT4b	7 (29.16)	41 (89.1)	
pN stage (%)	-	-	-
pN0	15 (62.5)	58 (63.7)	0.911
pN1 and above	9 (37.5)	33 (36.3)	
Total Mesorectal LNs, mean (range)	11.37 (2-28)	11.45 (0-50)	0.972
Positive mesorectal LNs, mean (range)	2.08 (0-28)	1.31 (0-17)	0.454
U/L LPLN, mean (range)	2.85 (1-5)	3.11 (1-5)	0.750
pCR (%)	02 (8.3)	15 (16.5)	0.498
Recurrence	03(12.5)	35(38.5)	0.031
Local	0	08	
Distant	03	27	
Estimated 2year DFS (%)	73.5	60.9	0.244

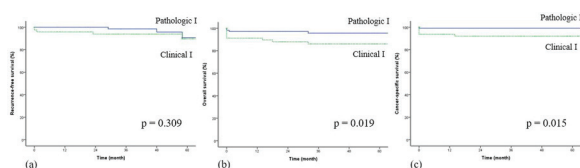
CRM= Circumferential resection margin; LN= Lymph node; U/L= Unilateral; LPLN= Lateral pelvic LN; pCR= Pathological complete response;

to review the pathologic stage of the clinically early stage right side colon cancer.

Methods/Interventions: Patients were treated for clinical stage I right side colon cancers (cecal, ascending, hepatic flexure, proximal transverse colon) between July 2006 and December 2014 at a tertiary teaching hospital. Open surgery was not included because laparoscopic surgery is a major and initial procedure.

Results/Outcome(s): During the period, there were a total of 80 patients diagnosed with clinical stage I right side colon. There were 15 patients in cT1 and 65 in cT2, four cases of cecal cancers, 48 cases of ascending colon, 13 of hepatic flexure colon, and 15 of proximal transverse colon cancers. Seventy were performed right hemicolectomy, and 10 had extended right hemicolectomy. There was no open conversion case. Lymph nodes were numbered according to the Japanese Classification of Colorectal Carcinoma, among these cases, 76 (95%) included principal nodes as 203 and/or 223, which can be considered as radical lymph node dissection. Pathological stage was identified as 5 for stage 0, 35 for stage I, 25 for stage II, and 15 for stage III. Patients under stage I were 50% of all patients, and patients with high risk in Stage IIA were 20 accounting for 25% of the total. During follow-up, one local and four systemic recurrences were found, with a total of 6 cases were related cancer specific death. There were statistical differences between clinical and pathological stage I in overall and cancer-specific survival when compared with 113 patients who had been diagnosed pathological stage I in right side colon cancer during the period.

Conclusions/Discussion: For right side colon cancer, even in the case of clinically early stage, radical lymph node dissection should be performed for exact staging, determination of adjuvant treatment, and better survival.



Comparison of Kaplan–Meier curves: disease-free survival (a), overall survival (b), and cancer-specific survival (c) between clinical and pathologic stage I of right side colon cancers.

PROGNOSTIC IMPACT OF PERSISTENT LOWER NEUTROPHIL-TO-LYMPHOCYTE RATIO DURING PREOPERATIVE CHEMORADIOTHERAPY IN LOCALLY ADVANCED RECTAL CANCER PATIENTS: A PROPENSITY SCORE MATCHING ANALYSIS.

P276

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Purpose/Background: This study investigated the significance of change in neutrophil-to-lymphocyte ratio (NLR) during preoperative chemoradiotherapy (preop-CRT) in patients with non-metastatic rectal cancer using a propensity score matching method (PSM).

Methods/Interventions: Patients who underwent surgery after completion of preop-CRT for non-metastatic rectal cancers from Jan 2004 to Dec 2013 were retrospectively enrolled. NLRs were obtained before commencement of CRT (pre-NLR) and between completion of CRT and surgery (post-NLR). Using Cox regression hazards models, the association of NLRs with survival after PSM was examined.

Results/Outcome(s): A total of 131 patients were grouped as follows: group A, pre-NLR < 3 & post-NLR < 3 (n = 47); group B, pre-NLR < 3 & post-NLR ≥ 3 (n = 45); group C, pre-NLR ≥ 3 & post-NLR < 3 (n = 5); group D, pre-NLR ≥ 3 & post-NLR ≥ 3 (n = 34). There was no difference in disease-free survival (DFS) or overall survival (OS) rate according to group. When dichotomized into group A versus groups B-D, DFS was higher in group A (84.7%) than groups B-D (67.5%, p = 0.021). After PSM (n = 94), multivariable analysis identified persistent lower NLR as an independent favorable prognosticator of DFS (HR 0.37, 95% CI 0.15 – 0.92, p = 0.033) (Table).

Conclusions/Discussion: Persistent non-inflammatory state measured by NLR may be an indicator of decreased risk of recurrence in patients with locally advanced rectal cancer treated with preop-CRT.

OUTCOMES AND COMPARISON OF TWO ROBOTIC PLATFORMS PERFORMING TRANSANAL MINIMALLY INVASIVE SURGERY FOR RECTAL NEOPLASIA: A CASE SERIES OF 21 PATIENTS.

P277

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Purpose/Background: Colorectal cancer remains the third most common cancer effecting adults, with an estimated 40,000 new diagnosis in 2018. Current surgical guidelines recommend transanal excision of early rectal neoplasia up to 8cm from the anal verge. Here we report a

comparison of two novel approaches for transanal robotic local excision, both of which achieved R0 resections of rectal cancers, on average, higher than 8cm: the da Vinci[®]Si and Flex[®]Colorectal Drive robotic platforms.

Methods/Interventions: Twenty-one cases of robotic assisted transanal surgery for early stage disease (T0-T1, N0) were reviewed; the authors first ten cases performed with the da Vinci[®]Si robotic platform between 2013 and 2016, and the first eleven cases performed using the Flex[®]Medrobotics platform between August 2017 and August 2018.

Results/Outcome(s): All cases were diagnosed preoperatively with colonoscopy; the average distance from the anal verge was approximated at 11.1cm and 9.58cm for the da Vinci[®]Si and Flex[®] Colorectal Drive robots, respectively. The average operative time was 167 minutes for the da Vinci[®]Si and 110 minutes for the Flex[®]Colorectal

Drive; the average blood loss was 37.5cc and 9.5cc for the da Vinci[®]Si and Flex[®] Colorectal Drive robots. In the da Vinci[®]series, four cases required intraoperative conversion, with one conversion requiring robotic-assisted abdominal access to repair a proctotomy. In the Flex[®] robotic series, one case was aborted due to inability to position the robot at the anatomic site of the lesion. All margins in both cohorts were histologically negative when surgically complete and there have been no recurrences to date.

Conclusions/Discussion: Transanal robotic surgery may provide the colorectal surgeon with a method to address rectal lesions farther from the anal verge than previously described. The Flex[®] Colorectal Drive platform may provide superior ability to navigate the nonlinear anatomy of the rectum and distal sigmoid as suggested by decreased conversion rates and operative times.

P276 Univariable and multivariable Cox-regression analysis for disease free survival after PSM (n = 94)

		Univariable analysis		Multivariable analysis	
		Hazard Ratio (95% CI)	P	Hazard Ratio (95% CI)	P
cT stage	cT2	1			
	cT3	2.82 (0.64 – 12.27)	0.167		
	cT4	3.89 (0.78 – 19.28)	0.096		
cN stage	cN (-)	1			
	cN (+)	4.05 (0.95 – 17.23)	0.058		
Tumor distance from anal verge (cm)	< 6	1			
	≥ 6	2.49 (1.03 – 6.04)	0.042		
Operation time (min)	< 360	1			
	≥ 360	1.31 (0.49 – 3.53)	0.582		
Tumor size (cm)	< 5	1			
	≥ 5	5.28 (1.23 – 22.7)	0.025		
ypT	ypT0-2	1		1	
	ypT3-4	3.26 (1.39 – 7.63)	0.006	2.42 (1 – 5.8)	0.048
ypN	Negative	1		1	
	Positive	5.88 (2.62 – 13.19)	<0.001	5.6 (2.43 – 12.93)	<0.001
CRM	Positive (≤ 1 mm)	1			
	Negative (> 1mm)	1.39 (0.18 – 10.7)	0.746		
	missing	1.31 (0.17 – 9.76)	0.792		
Postoperative Morbidity	No	1			
	Yes	2.05 (0.92 – 4.6)	0.079		
pre-NLR	< 3	1			
	≥ 3	2.01 (0.86 – 4.7)	0.107		
post-NLR	< 3	1			
	≥ 3	2.08 (0.91 – 4.77)	0.081		
Combination of pre&post NLRs	Control	1		1	
	pre-NLR<3 & post-NLR<3	0.37 (0.15 – 0.89)	0.027	0.37 (0.15 – 0.92)	0.033
Pre-CRT CEA (ng/mL)	< 5	1			
	≥ 5	2.3 (1.0 – 5.14)	0.042		

LONG-TERM ONCOLOGIC OUTCOMES FOR PATIENTS WITH TUMOR SCATTER.

P278

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Purpose/Background: In 2012, we conducted a study of 75 patients who underwent neoadjuvant chemoradiation followed by radical resection for locally advanced rectal cancer. In that study, we identified 55 patients with residual cancer and of those 49.1% had tumor scatter outside the overlying residual mucosal abnormality (RMA). Besides perioperative and pathologic characteristics, there was not enough follow-up time to comment on oncologic outcomes. This follow-up study examines the long-term oncologic outcomes of our original tumor scatter patients.

Methods/Interventions: After IRB approval was obtained, we performed a retrospective review of the 75 patients included in the original tumor scatter study. These patients had undergone neoadjuvant chemoradiation followed by radical surgery from 2006-2011. Descriptive statistical analysis and univariate analysis using Kaplan-Meier plots and log-rank tests was conducted. For results that reached statistical significance, we created a Cox proportional hazards model that adjusted for age, BMI, race and gender for multivariate analysis. Statistical analysis was performed on SAS version 9.4 and R version 3.5.1.

Results/Outcome(s): For the 75 patients included in this analysis, mean age was 59 years (28-88) at time of surgery and 54.7% were female. Most patients were white (77.3%), 12 (16%) were black and 4 (5.3%) patients were Hispanic. Mean follow-up from date of surgery was 4.6 (± 3.7) years. 49 (64.5%) patients had greater than 2 years follow-up and 36 (47%) were followed for over 5 years. Local recurrence occurred in only two patients so it was not included in the analysis. Distant recurrence was 18.4% and mean time from surgery to distant recurrence was 798.7 days (50-2191). Mortality rate was 22.6% and mean time from surgery to death was 1232.1 (97-2654 days). 50 (66.7%) patients had confirmed 2-year survival (25.3% lost to follow-up). 38 (50.7%) patients had confirmed 5-year survival (36% lost to follow-up). In univariate analysis, at initial staging, node-positivity was not predictive of distant recurrence ($p=0.071$); however, pathologic N1 or N2 disease was significantly associated with shorter time to distant recurrence ($p=0.015$). Patients with postoperative T3 or T4 tumors developed distant recurrence faster than those with lower T stage ($p=0.016$). Patients with preoperative node-negative disease had a shorter time to death than those with preoperative N1 or N2 disease ($p=0.009$). However, patients with pathologic N1 or N2 disease had a shorter time to death than those who were node-negative after treatment ($p=0.006$). When a multivariate model was created controlling for age, BMI, race, and

gender, pathologic node-positive disease remained significant for both distant recurrence and mortality ($p=0.014$, $p=0.007$, respectively), but initial N stage did not ($p=0.0501$). Patients with complete pathologic response did have improved overall survival although it was not significant, but these patients were less likely to develop a distant recurrence ($p=0.023$). When tumor scatter was examined in relation to oncologic outcomes, the presence of any scatter, proximal, lateral or distal scatter was not associated with distant recurrence or mortality or time to either outcome (Table 1).

Conclusions/Discussion: For our patients with locally advanced rectal cancer, the most important predictor of mortality and distant recurrence was node positivity on final pathologic evaluation. Time to distant recurrence and death was faster in these patients as well as those with advanced postoperative T stage. Tumor scatter was not associated with recurrence or mortality. This finding may not be surprising given that all of our patients had negative resection margins, even in those who did have tumor scatter, and this may have led to the very low recurrence rate. The clinical significance of tumor scatter is likely related to the upfront operative decision-making for irradiated rectal cancers. Our findings confirm the importance of negative resection margins as well as systemic treatment for rectal cancer, especially in node positive disease.

LESSONS LEARNED ABOUT PERFORMING ESD WITH A COLONOSCOPE OVERTUBE DEVICE THAT CREATES A WORK SPACE AND PERMITS TISSUE RETRACTION IN AN EX VIVO BOVINE COLON/RECTUM MODEL. LESSONS LEARNED ABOUT PERFORMING ESD WITH A COLONOSCOPE OVERTUBE DEVICE THAT CREATES A WORK SPACE AND PERMITS TISSUE RETRACTION IN AN EX VIVO BOVINE COLON/RECTUM MODEL.

P279

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Purpose/Background: ESD is the gold standard for the en bloc removal of large sessile colon neoplasms. With ESD the lesion is systematically detached with a needle knife by moving the scope tip with a "hot" needle knife extended in a controlled manner; this is difficult because, other than gravity (if patient positioned so polyp is in "up" position), there is no tissue retraction. ESD requires unique skills and has a long learning curve. Several overtube devices, through which the colonoscope is inserted, create a "therapeutic zone" at the polyp site and also allow tissue retraction via a grasper inserted via a working channel(s) on the overtube device. This preliminary study carried out using an ex vivo bovine large bowel model assessed one

overtube device, the ORISE Tissue Retraction Device (TRS) (Boston Scientific, Boston, MA) which is intended for rectal and sigmoid polyps. The goal was to establish a strategy/approach to polypectomy using the device.

Methods/Interventions: The ex vivo bovine large bowel model (harvested intact colon, rectum and sphincter) is ideal for gaining experience with the overtube device and for developing a resection strategy prior to clinical use. After harvest, the colon is cleaned, filled with antibiotic solution, and refrigerated until used, preferably within 4-6 hours. A circular "lesion" is branded onto the mucosal surface via a colotomy that is suture closed. Three to 4 rubber bands attached to a large peg board loosely encircle the colon and hold it in the desired shape and position. The overtube accommodates a pediatric colonoscope; To resect the polyp the scope and overtube must be inserted through the anus and colon until the overtube's "cage", once deployed, is positioned over the polyp. Tissue graspers (similar to endo biopsy forceps) are inserted through the overtube's working channel and instrument guide which is bent at the tip so that the grasper, when advanced, is deflected toward the cut mucosal edge that is grasped and lifted upwards providing traction. A needle knife, inserted via the colonoscope working channel, is then used to detach the polyp in the submucosal plane by moving the scope tip across the dissection field. The retraction point is altered as needed.

Results/Outcome(s): Twelve en bloc disc resections were attempted using 4 bovine colons. 10/12 cases (83%) were successfully completed; it was not possible to grasp the mucosal cut edge in 2 cases when the lesion was situated just proximal to a fold or sharp turn which obscured the view of the lesion. The mean duration of finished cases was 35.5 minutes (range 25-51) which is much shorter than the mean case length of 20 ESD's performed using only a needle knife and the same model (79.1 minutes, range 28-150). There were no full thickness perforations in the ORISE cases (vs 15.8% perforation rate in the standard ESD group), however superficial muscle injuries were commonly seen in both the ORISE and standard ESD groups. It was noted that in large diameter colons the struts of the fully opened device did not well secure its position. Regarding resection strategy, it was quickly noted that it was difficult to establish the lift and to score the mucosa with the overtube in place, thus, lift establishment and mucosal scoring are best done prior to insertion of the overtube/scope assembly. It was also noted that, because retraction of the disc edge up into the bowel lumen blocks the view proximally, dissection must begin distally and proceed proximally. Also, unlike standard ESD, the mucosal circumference should be fully incised (360 degrees) prior to device insertion because it is very difficult to score proximally after retraction has been instituted. Of note, it proved necessary to re-position the

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Variables	Overall	Frequency in	p value	Frequency in Distant	p value
	Frequency n = 75 (%)	Mortality Group n =16 (%)		Recurrence Group n=14 (%)	
Scatter	28 (50)	8 (53.5)	0.79	7 (50)	0.9
Proximal Scatter	14 (25)	4 (26.7)	(0.84)	3 (21.4)	0.42
Distal Scatter	12 (21.4)	5 (33.3)	0.21	3 (21.4)	0.76
Lateral Scatter	21 (37.5)	8 (53.3)	0.097	6 (42.9)	0.58
PreOp N Stage					
N0	50 (66.7)	15 (93.8)	0.009	12 (85.7)	0.071
N1	24 (32.0)	1 (6.3)		2 (14.3)	
N2	1 (1.3)	0 (0)		0 (0)	
PostOp N Stage					
N0	53 (70.7)	8 (50)	0.006	7 (50)	0.015
N1	17 (22.7)	6 (37.5)		5 (35.7)	
N2	5 (6.7)	2 (12.5)		2 (14.3)	
PostOp T Stage					
T0	21 (28)	2 (12.5)	0.19	0 (0)	0.016
T1	6 (8)	0 (0)		0 (0)	
T2	19 (25.3)	8 (50)		5 (35.7)	
T3	28 (37.3)	6 (37.5)		9 (64.3)	
T4	1 (1.3)	0 (0)		0 (0)	
Complete Pathologic Response	19 (25)	2 (11.8)	0.13	0 (0)	0.023
Adjuvant Chemotherapy	44 (77.2)	8 (61.5)	0.2	10 (83.3)	0.2
Local Recurrence	2 (2.6)	2 (100)	-	1 (50)	-

therapeutic zone (move the overtube) during the case in order to grasp the mucosal cut edge. Also, even with the maximally angled grasper guide, the deflection angle was $\approx 30^\circ$ and it was necessary to pull the overtube well distal to the lesion while advancing the grasper forward in order for the grasper to intersect with the cut mucosal edge.

Conclusions/Discussion: The ex vivo bovine model proved a reasonable platform for assessment of the ORISE TRS system and development of a resection strategy. Clearly, the ability to grasp and retract the cut edge greatly facilitates ESD; it was possible to do this 83.3% of the time. Case times with the overtube device were >50% shorter vs standard ESD times. To perform ESD with this system the following technique changes are advised: lift and full scoring around lesion prior to insertion of the ORISE/scope assembly, alter the device's position as needed to allow grasping, and work in distal to proximal direction. This overtube device merits further evaluation. A prospective clinical study is planned.

OUTCOMES IN LEFT HEMICOLECTOMIES: THE BENEFITS OF THE ROBOTIC APPROACH.

P280

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Purpose/Background: Due to its surgical anatomy, laparoscopic left colectomies have been considered more difficult to perform when compared to right colectomies, which has been re-affirmed with findings of longer learning curves and greater rates of conversion to open procedures on this side. Outcomes between robotic and laparoscopic approaches have been shown to be equivalent in regards to morbidity and mortality, with some studies demonstrating decreased conversion rates to open procedures in complex disease or obese patients. However, the robotic approach has been shown to be more expensive with longer operative times, raising questions regarding its role in colorectal surgery. Currently, there is limited data demonstrating the surgical performance of the robotic approach compared to the laparoscopic approach in regards to left-sided procedures specifically. Given the difficulties of left-sided procedures, the robotic platform has the potential for improved outcomes due to its innate functionality. The purpose of this work is to investigate the performance of the robotic versus laparoscopic left hemicolectomy to determine the impact the robotic approach has on outcomes.

Methods/Interventions: The American College of Surgeons National Surgical Quality Improvement Project Colectomy Targeted Dataset from 2012-2017 was used for this study. Adult patients undergoing elective left hemicolectomy for benign and malignant pathology were included. Patients were stratified based on robotic or laparoscopic approaches.

Results/Outcome(s): There were a total of 20,017 laparoscopic left hemicolectomies and 3,438 robotic left hemicolectomies included for analysis. There were significantly fewer wound events (to include surgical site infections, deep wound infections, organ space infections and dehiscence) (OR 0.77 95% CI 0.66-0.91) and rates of sepsis (OR 0.74 95% CI 0.56-0.98) in the robotic versus the laparoscopic group. There was a trend towards fewer anastomotic leaks in the robotic versus laparoscopic group (OR 0.85 95% CI 0.66-1.09), although this did not reach significance. There was no significant difference in pulmonary events, bleeding, VTE, readmission, return to OR, or 30-day mortality between the groups.

Conclusions/Discussion: In a nationally representative sample comparing laparoscopic and robotic left hemicolectomies, the robotic approach was associated with significantly fewer wound events and sepsis, and a trend towards fewer anastomotic leaks. These results may suggest improved outcomes in left colectomies using the robotic platform as opposed to the laparoscopic approach. Further cost analysis should be performed to assess the financial benefits of these outcomes measures.

ROBOTIC COLORECTAL OUTCOMES: AN ANALYSIS OF 511 CASES BY A SINGLE PROVIDER.

P281

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Purpose/Background: The analysis of a large, single-provider robotic colorectal database provides a solid reference framework for the role of a robotic platform in a colorectal practice. This is the largest single surgeon robotic database analyzed to date.

Methods/Interventions: A single-provider's prospectively gathered robotic database was reviewed from 2009-2018. All colorectal cases from those years were included for analysis. Additionally, all colorectal cases from the first (October 2009-September 2010) and last (October 2017-September 2018) year of data collection were analyzed for comparison of operative times, rates of conversion, return to OR, complications (leak, sepsis, wound breakdown), hospital length of stay and 30-day readmission.

Results/Outcome(s): 511 colorectal cases were included for analysis. Average patient age and BMI was 58.74 years and 28.66mg/kg², respectively. The types of procedures for the entire database included right colectomy (125, 24.46%), left colectomy/LAR/sigmoidectomy (273, 53.42%), subtotal/total colectomy (18, 3.52%), and other (56, 15.82%). The indications for surgery were malignancy (47%), diverticulitis (22%), polyposis (14%), inflammatory bowel disease (5%), and other (8.61%). In

the first year of utilization, 86 robotic colorectal cases were performed, including 25 right hemicolectomies (29%), 53 left hemicolectomies (62%), 4 APRs (4%), and 4 subtotal/total colectomies (4%). In the last year of data collection 59 robotic colorectal cases were performed: 14 right hemicolectomies (24%), 1 transverse colectomy (2%), 26 left hemicolectomies (44%), 2 APRs (3%), and 4 other colonic procedures (6%). Additionally, in this timeframe there were 12 procedures (20%) completed using a novel robotic platform, the Medrobotics Flex® Colorectal Drive (outcomes from these cases were not included in first and last year case analysis below). The mean operative time for the first year was 307.16 ±140.47 minutes, which was significantly longer than the last year, 236.57 ±110.4 minutes ($p=0.047$). Hospital length of stay was longer in the first year of robot utilization (6.5 ± 7.4) as opposed to the last year (4.4 ± 3.1), however this did not reach statistical significance (0.052). There was no statistical difference between the first and last year of data collection in conversions (10 versus 3), return to OR (4 versus 0), leak (2 versus 3), sepsis (5 versus 4), wound breakdown (5 versus 3), or 30-day readmission (6 versus 4), although all these measures improved clinically with the exception of leak rates.

Conclusions/Discussion: This large single provider robotic colorectal experience demonstrates the benefits and safety of this platform in a colorectal surgery practice, including significantly decreased operative time with trending decreases in hospital length of stay. Post-operative complications rates also clinically down-trended with robotic utilization as the learning curve improved. Further, the addition of different robotic platforms expanded the robotic impact and role in colorectal practice.

ASSOCIATION BETWEEN TEACHING STATUS AND OUTCOMES FOR RECTAL CANCER PATIENTS WITH MEDICAID OR NO INSURANCE IN COMMISSION ON CANCER HOSPITALS.

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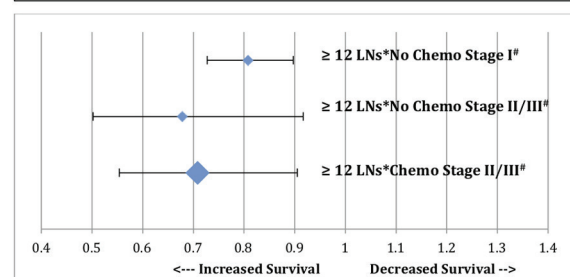
Purpose/Background: It is well-reported that under-insured patients with rectal cancer generally have worse outcomes compared to those with private insurance. Teaching hospitals may provide access to resources for patients of low-socioeconomic (SES) status that are not widely available at non-teaching hospitals. We hypothesize that under-insured patients who receive care at teaching hospitals are more likely to receive National Accreditation Program for Rectal Cancer (NAPRC) guideline-concordant care and have better long-term survival.

Methods/Interventions: All non-metastatic rectal cancer patients with Medicaid or no insurance were included within the National Cancer Database (NCDB) from 2004-2015. Patients were compared by their treatment facility's involvement with post-graduate education, which was defined as required vs. optional for teaching or non-teaching facilities, respectively. The following NAPRC measures were evaluated: (i) clinical staging completion, (ii) treatment start day ≤ 60 days of diagnosis, (iii) pre-treatment carcinoembryonic antigen (CEA) testing, (iv) surgical margin status, (v) pathological lymph node evaluation, and (vi) tumor regression grading. Bivariate and multivariate analyses were completed, including Kaplan-Meier and Cox proportional hazard models for survival analyses.

Results/Outcome(s): Of the 8,646 patients that met inclusion criteria, 60% and 40% were treated in non-teaching vs. teaching facilities, respectively. While teaching facilities comprised only 13% of the total reporting centers, they were more likely to be high-volume, 62% vs. 15%, $p < 0.01$. There were similar rates of sphincter-preserving surgery, negative margin status, and CEA testing between facilities by teaching-status. Teaching facilities were less likely than non-teaching facilities to have treatment start within 60 days of diagnosis (80% vs. 88%, $p < 0.01$) but this was not a significant predictor of survival on multivariable analysis. Interestingly, those treated at teaching centers were more likely to have the following: completion of clinical staging, 80% vs. 73%, $p < 0.01$; tumor regression grade reported, 55% vs. 48%, $p < 0.01$; and ≥ 12 LNs examined 68% vs. 61%, $p < 0.01$; all were significant on multivariable analysis except tumor regression. Despite these differences, there was no survival advantage for those treated at teaching facilities. Pathological evaluation of ≥ 12 LNs was a strong predictor of survival even when controlling for chemotherapy administration (Figure).

Conclusions/Discussion: Facility teaching-status was not associated with improved long-term survival of under-insured individuals. However, some processes of care that are commonly held to be markers of higher quality care (higher LN yield) were more common for patients treated at teaching facilities.

Figure- Cox Survival Analysis of Under-insured Rectal Cancer Patients with ≥ 12 Lymph Node Reported and Its Interaction with Chemotherapy Predicting Mortality



*Controlled for age, sex, race, ethnicity, comorbidities, stage of disease, tumor grade, treatment (radiation, chemotherapy), margin status, facility teaching status, and facility volume.

RISK FACTORS INCLUDING SURGEON CASE VOLUME FOR INTESTINAL ANASTOMOTIC LEAKS.

P283

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Purpose/Background: Leaks from intestinal anastomosis are devastating complications that can result in increased length of hospital stay, a permanent colostomy, and even death. The purpose of this study was to identify what factors were associated with anastomotic leaks. We also wanted to study how surgeon case volume impacts the incidence of leaks.

Methods/Interventions: We collected data on all patients 18 and older who underwent bowel resections at our institution from 2011-2015.

Results/Outcome(s): We identified 2,190 cases, of which 38 (1.7%) resulted in anastomotic leaks. Malnutrition, history of tobacco use, respiratory disorders, and chronic kidney disease were associated with leaks. Patients who leaked had a higher mortality rate. We found that low-volume surgeons (LVS), who conducted less than an average of 10 bowel resections a year, were significantly associated with a higher incidence of anastomotic leaks ($p=0.012$, odds ratio=2.78). The average leak rate for LVS was 3.72%, which was significantly higher than the leak rate for mid-volume surgeons (MVS), who averaged 10 to 29 bowel resections a year, at 1.69%, and higher than the leak rate for high-volume surgeons (HVS), who averaged more than 29 operations, at 1.46% ($p<0.05$).

Conclusions/Discussion: These identified risk factors should help surgeons better prepare for bowel resections. When possible, controlling risk factors by optimizing functions of vital organs such as the lungs and kidneys, and offering preoperative nutritional support should be considered to reduce leakage and mortality. Patients with several risk factors may be better left to higher volume surgeons, who have been shown to have lower leak rates.

EFFECT OF ENHANCED RECOVERY PROTOCOL ON LENGTH OF STAY AND READMISSION RATE IN PATIENTS UNDERGOING A COLECTOMY WITH OR WITHOUT STOMA CREATION: DOES TYPE OF STOMA MATTER?

P284

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Purpose/Background: Implementation of enhanced recovery protocols have resulted in decreased length of stay and readmissions. Hospital length of stay and readmission rates are usually increased in patients that receive an

ostomy after colorectal surgery. We aimed to evaluate the effect that enhanced recovery had on length of stay (LOS) and readmission rates (RAR) in patients undergoing a colectomy with or without stoma creation. We further looked into whether type of stomas created mattered: colostomy vs ileostomy, end vs loop.

Methods/Interventions: From an IRB approved database, patients who underwent a colon resection from July 2014 through April 2018 from a single surgeon were identified. Perineal proctectomies and emergent cases were excluded. All patients received the same enhanced recovery care. All patients with a planned creation of an ostomy received preoperative ostomy education. Primary outcome measures included hospital LOS and RAR.

Results/Outcome(s): Of 474 patients that underwent colon resections regardless of diagnosis, 428 were included in this study: 297 with no stoma, 131 with a stoma. Of these, 91 were ileostomies, 40 were colostomies, 78 were end ostomies, and 53 loop ostomies. There were no statistically significant differences in mean age, sex, race, BMI, or ASA class between cohorts. There was no difference in the measured compliance on 12 parameters of an enhanced recovery protocol between patients with or without a stoma creation. Patients that received stomas were more often immunosuppressed (29.8 vs 18.5%, $p=0.010$) and malnourished (7.6 vs 1.7%, $p=0.002$). Hospital LOS was longer for those that received stomas (7.5 vs 5.1 days, $p<0.0001$) and those that received loop ostomies vs end ostomies (8.2 vs 6.9 days, $p<0.0001$) but there was no statistically significant difference in LOS among patients who received ileostomies or colostomies. Hospital RAR was much higher for those receiving stomas (16.8 vs 6.1%, $p<0.0001$) but there was no difference in those that received ileostomies vs colostomies, or end vs loop ostomies. There was an observed increase in return to OR (7.6 vs 1.3%, $p=0.001$) and mortality (1.5 vs 0%, $p=0.033$) seen in patients undergoing stoma creations.

Conclusions/Discussion: Patients undergoing colorectal resections with an ostomy, in the setting of an enhanced recovery protocol, stay longer in the hospital and are at higher risk to get readmitted. Efforts should focus in more specialized enhanced recovery pathways for ostomates.

THE IMPACT OF TUMOR LOCATION ON OUTCOMES IN PATIENTS WITH RIGHT SIDED COLON CANCER.

P285

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Purpose/Background: There is a growing body of literature that location within the colon can impact colon cancer survival. The oncologic outcomes of right sided cancers are generally grouped together and not differentiated based on

the specific location in the colon. We hypothesized that within the subgroup of patients with right sided cancers, specific tumor location (cecal, ascending vs. hepatic flexure) may influence cancer specific outcomes.

Methods/Interventions: The SEER database was queried for patients over age 18 with non-metastatic, invasive (AJCC stage 1-3) right-sided colon cancer from 1988 to 2014 who underwent partial colectomy. Descriptive analysis was performed. Patients were categorized into 3 groups based on primary site of cancer: 1) cecum 2) ascending colon 3) hepatic flexure. Demographic, clinical and pathologic factors were compared between groups using univariate and multivariate analysis. Disease specific and overall survival were described using the Kaplan-Meier method and compared using the log-rank test. Multivariate Cox-regression analysis was performed to determine the independent association of primary tumor location with both disease specific and overall survival.

Results/Outcome(s): A total of 167,450 patients were identified who met inclusion criteria. The mean age of the population was 72.2 +/- 12.3 years and 59.9% were female. Of these, 81,611 (48.7%), 66,857 (39.9%), and 18,982 (11.3%) had cecal, ascending colon, and hepatic flexure cancers, respectively. Cecal cancers were associated with a lower number of examined nodes (15.6 +/- 0.03, 16.9 +/- 0.04, 16.3 +/- 0.08, cecum, ascending colon, hepatic flexure, respectively, $p < 0.001$), but a higher likelihood of nodal positivity (29.6%, 26.9%, 25.3%, respectively, $p < 0.001$). Patients with cecal cancers were also older (72.4 +/- 0.04, 72.1 +/- 0.05, 71.6 +/- 0.09 years, respectively, $p < 0.001$), had larger tumors (5.02 +/- 0.01, 4.74 +/- 0.01, 4.75 +/- 0.02 cm, respectively, $p < 0.001$) and had higher stage (35.9%, 32.0%, and 31.4%, stage 3 disease, respectively, $p < 0.001$). On univariate Kaplan Meier survival analysis, cecal cancers were associated with poorer disease specific (median 86.0, 93.0, and 89.0 months, respectively, $p < 0.001$) and overall survival (median not reached, $p < 0.001$). On multivariate analysis, controlling for potential confounders including sex, age, tumor size, number of examined nodes and stage, hepatic flexure cancers were associated with worse disease specific (HR 1.05 [95% CI 1.01 - 1.09]) and overall survival (HR 1.03 [95% CI 1.01-1.06]).

Conclusions/Discussion: Hepatic flexure cancers have worse survival compared to more proximal colon cancers. The cause is likely multifactorial, and may include biological factors such as microsatellite instability as well as potential technical factors, such as insufficient distal margin or distal nodal harvest. More aggressively surgical and multimodal therapy may need to be considered for hepatic flexure colon cancers.

DO DIFFERENT MINIMALLY INVASIVE TECHNIQUES AFFECT CLINICAL AND SHORT TERM OUTCOMES IN RIGHT COLECTOMIES?

P286

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Purpose/Background: The use of robotics in colorectal surgery has been steadily increasing. While it has been gaining traction as an alternative to laparoscopic methods in the colon and rectal resections, the oncological differences remain uncertain. This study evaluates the differences in lymph node retrieval, time to return of bowel function, and length of stay between the two methods in a single institution. To determine the real impact of robotic surgery, we compared clinical outcomes in a detailed in-depth analysis of a single center.

Methods/Interventions: In patients undergoing elective right colectomies at a single institution between the years of 2012 and 2018, the lymph node retrieval rates, return of bowel function, and length of stay were compared between robotic and laparoscopic methods. Independent samples student's t-tests was used to compare the surgical approaches.

Results/Outcome(s): Of the 89 cases, 50.5% were performed laparoscopically (n=45) and 49.5% were robotic (n=44). There was no difference in the number of lymph nodes retrieved ($p = 0.0999$). In comparing the means, the robotic method yielded 21.6 lymph nodes (+/- 9.73) while the laparoscopic method yielded 19.3 nodes (+/- 7.54). However, the average length of stay was shorter in the robotic group (4.2 days vs 5.04 days, $p = 0.04$) and the time to return of bowel function was shorter as well (2.5 days vs 3.1 days, $p = 0.04$).

Conclusions/Discussion: Although this study is limited to our institution and to minimally invasive surgeons, it shows that lymph node retrieval differences should not play a role in the decision of which operative modality is to be chosen in right colectomies. However, short-term clinical outcomes were in fact improved with the robotic approach, specifically in length of stay and time to return of bowel function.

EFFECT OF REGIONAL ANESTHESIA BLOCK ON POSTOPERATIVE OPIOID CONSUMPTION AFTER LAPAROSCOPIC COLORECTAL SURGERY: RETROSPECTIVE ANALYSIS.

P287

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Purpose/Background: To analyze the possible reduction in post-operative opioid use with Pre-operative Transverse Abdominal Plane (TAP) and/or Quadratus Lumborum (QL) block for laparoscopic colorectal surgery

Methods/Interventions: Retrospectively analyzed the amount of narcotics used post-operatively on patients having Laparoscopic colorectal surgery with pre-operative regional anesthesia versus those without. Outcomes included length of stay and narcotic use during hospital stay. Total measure of narcotics were converted to milligrams of PO Dilaudid. Patients with chronic pain issues were excluded and any patient with length of stay over 5 days were excluded from the study.

Results/Outcome(s): A total of 77 patients were analyzed in a 4 month period. In this population 14 patients received a pre-operative regional anesthesia block ranging from Quadratus Lumborum and/or Transverse Abdominal block. We saw a reduction in total narcotic use in patients who received a regional block compared to the rest of the patients. We saw a reduction of 23% in total Narcotic use in those patient with pre-operative blocks. Length of stay was similar in both groups.

Conclusions/Discussion: Quadratus Lumborum (QL) and/or Transverse Abdominal Plane (TAP) block appears to be an effective modality to limit the amount of Opioids used during the post-operative period. However, a larger study is needed to further test this hypothesis.

DOES DAY OF THE WEEK IMPACT LENGTH OF STAY IN COLORECTAL PATIENTS UNDER ERAS PATHWAYS?

P288

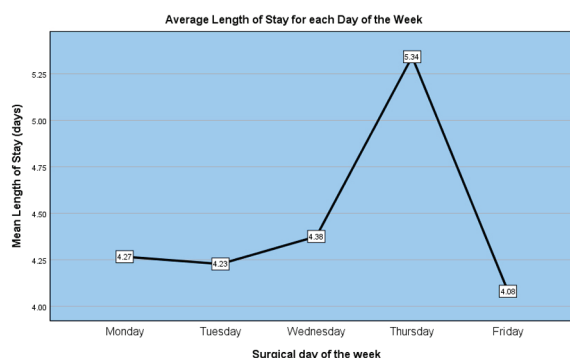
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Purpose/Background: The enhanced recovery after surgery (ERAS) protocol is a multidisciplinary approach to preadmission, preoperative, intraoperative, and postoperative care with the goal of improving patient recovery and facilitating early discharge from the hospital. Weekends in the hospitals are characterized by decreased staffing of ancillary services to coordinate patient discharges, which can lead to a prolonged hospital stay. The aim of this study was to analyze how the day of the week impacts the length of stay (LOS) in colorectal ERAS patients.

Methods/Interventions: A total of 280 patients who underwent colorectal surgery with ERAS pathways at Beaumont Health (Royal Oak, MI) were prospectively collected between November 2017 to October 2018 and retrospectively analyzed. Patients were divided into 5 cohorts based on which day of the week (Monday, Tuesday, Wednesday, Thursday, and Friday) their operation took place. Demographic and clinical history were collected from each patient. The LOS for each specific day of the week was the primary outcome. Statistical analysis was performed using SPSS software (version 21.0). Continuous data were reported as means (standard deviation) or medians (range), and descriptive variables were reported as frequencies.

Results/Outcome(s): The final analysis was performed on 252 patients. Most patients underwent robotic-assisted colorectal operations (47.2%). The remaining were open (31.3%) and laparoscopic-assisted (21.4%). The average LOS was the shortest if the operation was performed on a Friday (4.08 days) and the longest if performed on a Thursday (5.34 days). For Monday, Tuesday, and Wednesday, the average LOS was 4.27, 4.23, and 4.38 days, respectively. The overall average LOS was 4.45 days. There was no statistical significance with a day of the week compared to LOS ($p = 0.47$). Male sex was the only variable to have an increase LOS ($p = 0.03$).

Conclusions/Discussion: The length of hospital stay is not affected by the surgical day of the week in this study. Further investigation is required to determine if short-staffed services such as social work and rehabilitation on weekends influence LOS in colorectal ERAS patients.



ADIPOSE TISSUE GRAFTING IN THE MANAGEMENT OF ANASTOMOTIC LLEAK AFTER LOW ANTERIOR RESECTION.

P289

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Purpose/Background: An anastomotic leak (AL) is the most dreaded complication after low anterior resection. Fecal diversion, percutaneous drainage and endoscopic placed negative pressure therapy are the usual management strategies employed but a significant proportion of patients remain with a persistent defect despite these interventions. Healing rates are particularly low in the post irradiation setting as radiation induced ischemia precludes the generation of granulation tissue required for defect approximation. Adipose tissue derived mesenchymal stromal cells have been shown to accelerate tissue regeneration after radiation injury and hence adipose tissue grafting may help induce healing in an anastomotic defect.

Methods/Interventions: Between March 2014 and April 2018, 10 patients who developed an AL after low anterior resection and were sequentially treated with grafting of adipose tissue were included in the study. All patients had pelvic radiation during treatment and had a

diverting ileostomy either during index surgery or after the anastomotic leak was diagnosed. All patients in the series had a persistent defect despite being treated with other modalities such as suture repair, fibrin glue, endosponge and surgical debridement. Fat grafting was attempted once the abscess cavity has been debrided till healthy tissue remains. Fat was harvested from the subcutaneous layer of the abdomen using conventional liposuction technique. The fistulous tract was excised, and the purified harvested fat was injected in and around the tract using a blunt cannula. The outcomes were prospectively reviewed and reported in this case series. Successful healing of AL was defined by the absence of a defect on endoscopy and/or water-soluble enema followed by successful closure of the diverting ileostomy.

Results/Outcome(s): During the study period, ten patients underwent injection of adipose tissue for a persistent AL. The demographic and pathologic characteristics of the study cohort are illustrated in Table 1. Among the 10 patients in the series, 5 patients experienced complete healing of the anastomotic defect with successful reversal of the diverting ileostomy and no subsequent AL. One patient in the series had a healed anastomotic defect during sigmoidoscopy examination and a normal water-soluble enema and hence had his diverting ileostomy reversed. The patient unfortunately developed large bowel obstruction at the colorectal anastomosis and a recurrent AL 2 week after the procedure which necessitated rectal tube decompression and subsequent abdominal-perineal resection for persistent symptoms. In the remaining four patients, the outcome after adipose tissue grafting remains unknown as two patients succumbed to metastatic disease 10 months and 16 months after grafting, one was lost to follow up 7 months after grafting with evidence of persistent AL at last evaluation and the remaining patient developed a pelvic recurrence after 2 months of follow up which necessitated a pelvic exenteration. The median duration of follow up (after closure of the diverting ileostomy) for the 5 patients successfully treated with adipose grafting was 5 months (1-33 months). None of these 5 patients developed a recurrent AL. There was no surgical morbidity related to the harvesting or injection of the adipocytes in this series.

Conclusions/Discussion: Adipose tissue grafting is safe and feasible. It is a useful addition to the armamentarium in the management of persistent AL after low anterior resection.

OUTCOMES OF PATIENTS WITH DIABETES UNDERGOING ERAS COLORECTAL SURGERY: A RETROSPECTIVE MULTI-CENTRE CASE CONTROL STUDY.

P290

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Purpose/Background: Enhanced recovery after surgery (ERAS) pathways have been independently linked to decreases in post-operative complications and mortality. Despite the success of ERAS, however, there is a lack of evidence for ERAS in patients with diabetes mellitus (DM). Our study aims to compare patients with and without DM undergoing elective colorectal surgery following ERAS. We hypothesize that despite ERAS peri-operative optimization, patients with DM will have worse outcomes due to risks associated with glycemic homeostasis.

Methods/Interventions: Using the provincial ERAS database, patients with type 1 or type 2 DM undergoing elective colorectal surgery between August 2014 and October 2016 at two academic hospitals in Edmonton, Alberta were identified. Each patient with DM was matched to 3 patients without DM to maximally detect outcome differences. Matching was performed based on age, gender, body mass index (BMI), and American Society of Anesthesia physical status score (ASA), surgical approach, and procedure performed. Our primary outcome was defined as infectious and non-infectious post-surgical complications, such as wound infection, pneumonia, urinary tract infection, pulmonary embolus, postoperative ileus, and anastomotic leak. Secondary outcomes included length of stay, 30-day mortality and 30-day re-operation rate. Analysis was done using Fisher's exact test for categorical variable and Mann-Whitney's test for continuous variables.

Results/Outcome(s): A total of 504 patients were included (126 with DM). Despite careful matching, there were statistically significant differences in BMI (31.1 with DM vs. 29.1 without DM, $p=0.001$) and ASA (mode ASA 3 with DM vs. ASA 2 without DM, $p=0$). No statistically significant difference was seen in postoperative infectious complications (15.9% with DM vs 9.79% without DM, $p=0.074$), and non-infectious complications (26.2% with DM vs 19.1% without DM, $p=0.1$). However, length of stay was significantly increased in patients with DM (9.02 days with DM vs 7.93 days without DM, $p=0.025$). Thirty-day mortality (1.59% with DM vs 0.53% without DM, $p=0.1$) and 30-day reoperation rate (4.76% with DM vs 4.76% without DM, $p=1$) did not differ.

Conclusions/Discussion: Patients with DM undergoing elective colorectal surgery have a longer length of stay compared to patients without DM. BMI may be partially contributory but given an absolute BMI difference of 2 between the two groups, this difference is likely not clinically significant. The statistically significant difference in

P289 Demographic and pathologic characteristics of the cohort treated with adipose tissue grafting

Patient Number	Age(years), Gender	Type of Surgery	TNM Staging	Margins Status	Size of defect prior to adipose tissue grafting (width x depth)	Treatment prior to adipose tissue grafting	Number of adipose tissue grafting injections	Final Outcome
1	54, Male	Low anterior resection and colo-rectal anastomosis	yPT-0N0M0	Clear	0.2cm x 3cm	Endosponge x 4 Surgical debridement x 3 Advancement flap x 1	1	Success
2	54, Female	Low anterior resection and colo-rectal anastomosis	yPT-3N2aM0	Clear	2cm x 1cm	Endosponge x 14 Surgical debridement x 1	1	Unknown-demised from recurrent disease
3	69, Male	Low anterior resection and colo-rectal anastomosis	yPT-0N2bM0	Clear	~NM x 4cm	Fibrin glue x 2	1	Success
4	47, Female	Low anterior resection and colo-rectal anastomosis	yPT-3N2aM0	Clear	~NM	Surgical debridement x 1	1	Unknown-demised from recurrent disease
5	72, Male	Low anterior resection and colo-rectal anastomosis	yPT-3N0M0	Clear	2cm x 4cm	Surgical debridement x 1	2	Unknown-lost to follow up
6	35, Male	Low anterior resection and colo-anal anastomosis	yPT-2N0M0	Clear	~NM	Endosponge x 4	2	Failure - required abdomino-perineal resection
7	33, Male	Low anterior resection and colo-rectal anastomosis	yPT-3N2bM0	Clear	~NM	Surgical debridement x 1	1	Unknown-developed recurrence requiring exenteration
8	54, Female	Low anterior resection and colo-anal anastomosis	yPT-0N0M0	Clear	~NM x 2cm	Surgical debridement x 7	3	Success
9	69, Male	Low anterior resection and colo-rectal anastomosis	yPT-0N0M0	Clear	0.5cm x 1cm	Suture repair x 1	1	Success
10	56, Male	Low anterior resection and colo-anal anastomosis	yPT-2N1bM0	Clear	0.5cm x 4cm	Endosponge x 3	1	Success

~NM – Not mentioned

ASA score may also contribute to a longer length of stay in the DM group. However, it is unclear whether diabetes represents an inherent increase in the severity of systemic comorbidities that subsequently leads to worse outcomes including longer length of stay. Although not statistically significant, patients with DM had higher infectious as well as non-infectious complications, which may further contribute to their longer length of stay. A subgroup analysis of patients with diabetes that focuses on specific pre-operative factors that lead to adverse outcomes is in progress.

OUTCOMES OF CONVERSION FROM MINIMALLY INVASIVE TO OPEN PROCTECTOMY FOR RECTAL ADENOCARCINOMA: A NSQIP ANALYSIS.

P291

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Purpose/Background: While unplanned conversions from minimally invasive to open proctectomy for rectal cancer reflect a multitude of technical and patient-related factors, the impact of these conversions on outcomes are not well known. This study used the American College of Surgeons National Surgery Quality Improvement Program (ACS-NSQIP) database to compare oncologic specimen outcomes and 30-day postoperative morbidity in patients with unplanned conversions to both non-converted minimally invasive and open proctectomy for rectal adenocarcinoma.

Methods/Interventions: The 2016-2017 ACS-NSQIP proctectomy-targeted and standard participant user file database was used to identify patients who underwent low anterior resection (LAR) and abdominoperineal resection (APR) for rectal adenocarcinoma. Initial operative approach (open, laparoscopic, or robotic) and conversions were captured. Patient demographics and preoperative variables were compared. Lymph node harvest (≥ 12 nodes examined), circumferential radial margin, and distal margin status were examined. Pre-operative variables, pathological outcomes, and post-operative morbidity were compared using analysis of variance tests and chi square tests.

Results/Outcome(s): Of a total of 1,346 patients, initial operative approach was 458 (34.0%) open, 545 (40.5%) laparoscopic, and 343 (25.5%) robotic. 73 (13.4%) patients underwent unplanned conversion, from laparoscopic and 17 (5.0%) from robotic. Patients were grouped based on final operative approach into open (n=458), minimally invasive (MIS; n=798), and unplanned conversion (n=90) cohorts for analysis. The unplanned conversion cohort was older (average age 65.5 years vs.62.3 in open, 61.0 in MIS, p=0.00) and more likely to be obese (53%

vs. 36% in open, 31% in MIS, p=0.00). The MIS cohort had the lowest proportion of ASA class 3 or 4 at (59.0% vs. 70% in open, 64% in converted, p=0.00). The open surgery cohort had the highest percentage of APRs (65% vs. 55% in MIS, 59% in converted, p=0.01). There were no significant differences in gender, race, comorbidities, tumor location, clinical staging, or neoadjuvant therapy between the three cohorts. The unplanned conversion cohort had the longest operative time at average of 335 minutes (vs. 282 in open, 294 in MIS, p=0.00, Table). The cohorts did not differ for adequate lymph node harvest or negative distal resection margin rate, but the unplanned conversion and open cohorts had a statistically lower negative circumferential radial margin than the MIS cohort (conversion 90.0% vs. open 91.3% vs. MIS 95.5%, p=0.00). Unplanned conversions had the highest rate of superficial surgical site infections (13.3% vs. 7.0% in open, 3.4% in MIS, p=0.00). There were no statistically significant differences between rates of deep or organ space surgical site infections, anastomotic leak, or return to the operating room. The conversion group had highest rate of unplanned readmission, 23.3% (vs. 12.7% in open, 15.0% in MIS, p=0.03).

Conclusions/Discussion: NSQIP proctectomy data demonstrated that converted cases were somewhat rare and performed similarly to open surgery with respect to oncologic adequacy. Although limited by its retrospective nature, the data suggest that surgeons with appropriate advanced laparoscopic or robotic skills should not be dissuaded from pursuing minimally invasive approaches due to concern for poor outcomes in converted cases, although vigilant adherence to sterile technique during these challenging operations may decrease morbidity.

	Open n=458	Minimally Invasive n=798	Unplanned Conversion n=90	p-value
Operative Outcomes				
Operative time (minutes)	282 (SD 123)	294 (SD 116)	335 (SD 126)	0.00*
Pathological Outcomes				
≥ 12 nodes	367 (80.1%)	646 (81.0%)	69 (76.7%)	0.62
Negative circumferential radial margin	418 (91.3%)	762 (95.5%)	81 (90.0%)	0.00*
Negative distal resection margin	449 (98.0%)	790 (99.0%)	89 (99.0%)	0.35
Post-Operative Outcomes (30-day)				
Mortality	1 (0.2%)	1 (0.1%)	1 (1.1%)	0.17
Surgical Site Infections				
Superficial	32 (7.0%)	27 (3.4%)	12 (13.3%)	0.00*
Deep	8 (1.8%)	9 (1.1%)	1 (1.1%)	0.64
Organ space	25 (5.5%)	40 (5.0%)	6 (6.7%)	0.78
Anastomotic Leak	10 (2.2%)	18 (2.3%)	3 (3.3%)	0.79
Return to operating room	26 (5.7%)	38 (4.8%)	5 (5.6%)	0.76
Hospital stay, operation to discharge (days)	7.8 (SD 5.8)	5.8 (SD 4.9)	7.0 (SD 4.4)	0.00*
Unplanned readmission	58 (12.7%)	120 (15.0%)	21 (23.3%)	0.03*

Table. A comparison of pathological outcomes and post-operative morbidity between open, minimally invasive, and unplanned conversion cohorts. Operative time and days from OR to discharge were listed as mean and standard deviation (SD). All other values were listed as n (%). Outcomes with p<0.05 were designated with an asterisk.

SACRAL NERVE STIMULATION: THE QUALITY OF REPORTED RANDOMIZED, CONTROLLED TRIALS IN THE LAST TEN YEARS.

P292

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Purpose/Background: Sacral nerve stimulation has been evolved as a standard treatment for the treatment of several pelvic floor diseases. Faecal incontinence, Constipation, Irritable Bowel syndrome and Urinary symptoms are some of the clinical indications for this therapy. For many years evidence-based medicine has been considered the main way to advance clinical practice, replacing the traditional medical paradigm, which was based on authority and expert opinion. Evidence-based medicine primarily uses randomized, controlled trials to clarify the scientific basis for medical practice. A report of a randomized, controlled trial (RCT) should convey to the reader in a transparent manner why the study was undertaken and how it was conducted and analysed. The assessment of the methodologic quality of a trial is closely intertwined with the quality of reporting, that is, the extent to which a report provides information about the design, conduct, and analysis of the trial. This study was designed to analyse the characteristics and the quality of reporting of randomized, controlled trials published during the last ten years on sacral nerve stimulation used as a treatment for pelvic floor diseases.

Methods/Interventions: An electronic search for all randomized, controlled trials on sacral nerve stimulation was undertaken by using the MEDLINE database via PubMed. The data collected were divided into general data, characteristics of reporting, methodology quality assessment using the Jadad scale and a validated methodology quality score (MINCIR score), evaluation of the items published in the CONSORT statement, and the journal impact factor. Reports were divided into two groups: published articles from 2009 to 2013 (Group 1), and from 2014 to 2018 (Group 2).

Results/Outcome(s): Twenty-one trials fulfilled the inclusion criteria of the study (Group 1: n = 8; and Group 2: n = 13). The most reported topic in these trials were Fecal incontinence (33,3%), Chronic Constipation and Urology symptoms (both 28,6%). An additional two studies were focused on Irritable bowel syndrome (9,5%). The majority of all published RCT were carried out in Europe (57,14%). There were no significant differences regarding the characteristics of the different randomized trials between the two groups. However, more studies in Group 2 reported a flow chart (p=0,07), and were published on a higher journal impact factor (5,9 in Group 1 vs. 7,7 in Group 2, p=0,68). However, these differences were not significant. There was a higher score in Jadad scale (2,88 in Group 1 vs. 3,31 in Group 2, p=0,46) and

MINCIR score (17,63 in Group 1 vs. 20,38 in Group 2, p=0,10) in the RCTs in Group 2, but these differences were not statistical significant. When the different RCT were analyzed in regard to clinical indications (Urinary sintoms vs. gastrointestinal disorders), a higher impact factor (10,7 vs. 5,5, p=0,27, respectively) and MINCIR score (21,33 vs. 18,53, p=0,13) was observed, however the Jadad scale was lower (2,5 vs.3,4, p=0,14).

Conclusions/Discussion: In the last ten years there is a lack of high-quality reported randomized, controlled trials on Sacral Nerve Stimulation. There were no differences in the quality of reported randomized controlled trials in most recent years. There is a need of strategies to improve the quality of the reported studies in all therapies introduced on daily clinical practice.

COMPARISON OF SHORT-TERM CLINICAL EFFICACY AND QUALITY OF LIFE AFTER TRANSRECTAL NATURAL ORIFICE SPECIMEN EXTRACTION, MINI-LAPAROTOMY, AND TRADITIONAL OPEN SURGERY FOR THE TREATMENT OF COLORECTAL CANCER.

P293

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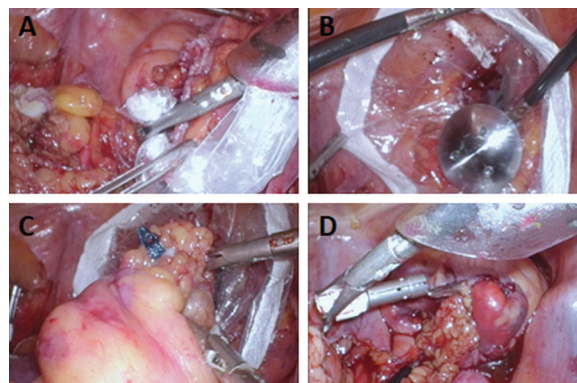
Purpose/Background: To study the clinical efficacy of transrectal natural orifice specimen extraction (NOSE), mini-laparoscopy, and open surgery in terms of patients' short-term recovery, and to determine the clinical efficacy of NOSE in the treatment of colorectal cancer and in improving patients' quality of life.

Methods/Interventions: In a randomized controlled study, 341 patients with colorectal cancer who were admitted to the Department of Gastrointestinal Surgery of Shanghai East Hospital between February 2014 and February 2016 were randomized into the NOSE (n=114), mini-laparotomy (Mini-LAP; n=121), and traditional open surgery (OS) groups (n=106). Preoperative and postoperative clinical indexes were analyzed and compared. Postoperative pain was analyzed using the visual analog scale (VAS). Preoperative and 1-month postoperative quality of life was assessed with the SF-36 quality-of-life questionnaire. Postoperative overall survival was analyzed using a K-M curve.

Results/Outcome(s): The NOSE group had the smallest abdominal incision and the lowest postoperative VAS score. No statistically significant differences in preoperative data such as sex, age, body mass index were found among the groups. The NOSE group had the longest operation time. The OS group had a significantly larger bleeding volume than the NOSE group. The time to the first anal exhaust after surgery and the length of hospital stay statistically significantly differed among the three groups, with the OS group having the longest time. The

incidence of postoperative complications was significantly higher in the NOSE group than in the Mini-LAP group. The K-M survival curve showed no statistically significant difference in the postoperative overall survival rate between the NOSE and Mini-LAP groups, but both groups were superior to that of the OS group.

Conclusions/Discussion: With the development of surgical techniques and equipment, the surgical treatment of colorectal cancer is gradually steering toward minimally invasive surgery, which is the current general trend in the field of surgery. NOSE is effective in reducing patients' postoperative pain by avoiding an abdominal incision. Postoperative pain relief contributed to the rapid rehabilitation of patients. In this study, the abdominal incision in the NOSE group was much shorter and the postoperative VAS score was lower than those in the other two groups, thereby indicating that postoperative pain mostly originated from the abdominal wall incision. In addition, reducing the size of the abdominal incision is beneficial for the prevention of complications such as incision infection and fat liquefaction. This study shows that NOSE is significantly advantageous in terms of postoperative short-term clinical efficacy. NOSE was significantly superior to Mini-LAP and OS in terms of the time to the first postoperative exhaust, length of hospital stay, and other indexes. In addition, postoperative complications were well controlled in both the NOSE and Mini-LAP groups, with no significant differences. By avoiding an abdominal incision, NOSE can significantly improve patients' postoperative quality of life while ensuring its clinical efficacy. This study shows significant differences in the patients' quality of life in the first postoperative month among the three groups. The overall quality of life was highest in the NOSE group and lowest in the OS group, with significant differences. Improved quality of life enables patients with colorectal cancer to achieve better rehabilitation, thereby improving the quality of treatment and meeting the trend of minimally invasive surgery. Certain problems are associated with NOSE that are yet to be resolved, such as the prevention of intra-abdominal infection and tumor metastasis. During colorectal cancer operation, the patient disease-free survival time will be severely affected once the tumor has spread. In this study, the specimen protective sleeve and intra-abdominal anvil placement were adopted to complete the intestinal reconstruction under laparoscopy. These innovative measures can effectively reduce the risk of intraoperative intra-abdominal infection during NOSE and prevent tumor metastasis. No significant difference in short-term tumor recurrence and survival rates were found between the two groups. Standardized procedures and the use of instruments such as the specimen bag can fully ensure the tumor-free and aseptic operation of NOSE. In the conclusion. When compared with mini-laparoscopy and open surgery, NOSE has obvious advantages in rapid rehabilitation and quality of life, and has minimal invasiveness for colorectal cancer.



- A: The specimen protective sleeve was inserted through the trocar, and a sterile channel was created
 B: Staple anvil was inserted through the channel
 C: Specimen was placed in the protective sleeve and pulled out
 D: The digestive tract reconstruction was finished in intra-abdominal operation

ERTAPENEM USED AS SURGICAL PROPHYLAXIS PREVENTS SSI BUT CONTRIBUTES TO ANTIMICROBIAL RESISTANCE.

P294

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Purpose/Background: Several studies have evaluated the use of ertapenem as surgical prophylaxis in the past decade. Ertapenem has been shown to be as effective as more common prophylaxis regimens such as cefotetan and ceftriaxone/metronidazole when it comes to preventing surgical site infections, but has the disadvantages of high cost and utilization of a broader spectrum antibiotic than necessary, when it comes to antimicrobial stewardship. It has also been suspected to increase certain side effects, such as *Clostridium difficile* infection. The aim of this study is to evaluate the role of ertapenem as surgical prophylaxis in a cohort of patients at a university hospital.

Methods/Interventions: A retrospective data analysis was performed on a group of patients operated on in August 2018, at the beginning of a colorectal residency in a university hospital training program. All patients who went to the OR for colon resection were entered into a de-identified databased and clinical data such as demographics, indication for surgery, type of wound and wound closure materials, cigarette-smoking status, and peri-operative antibiotics as well as pre-operative bowel preparation regimens were recorded. Analysis was performed with Microsoft Excel and SPSS.

Results/Outcome(s): 21 patients underwent colon surgery. 13 (61%) were male. 14/21 (66%) of these cases were elective operations performed on pre-operatively prepared bowel. 17 (81%) were stapled closed, the remainder had skin left open. Only 2 (9.5%) patients had a

wound vacuum closure device on their incision. Ertapenem was the most commonly used prophylactic antibiotic in this cohort, with 33% of patients receiving it. Others received Zosyn, Flagyl, or Vancomycin and Clindamycin if penicillin-allergic. 28% developed a superficial surgical site infection, but this was more common in patients who had Flagyl or Clindamycin alone for prophylaxis. 2 patients developed *Clostridium difficile* infection. 1 was in a patient who underwent elective surgery with ertapenem prophylaxis and the other was in a patient who had Clindamycin.

Conclusions/Discussion: Ertapenem may be a good choice of antibiotic prophylaxis in colon surgery, and several university hospital guidelines advocate its use. However, it may be related to *Clostridium difficile* infection and may contribute to higher costs and unnecessary antimicrobial resistance. Since some hospitals are using it, further evaluation is indicated to determine if its benefits indeed outweigh its risks.

POST-DISCHARGE OPIOID USE AFTER MAJOR COLORECTAL SURGERY IS PREDICTED BY OPIOID USE IN THE 24 HOURS PRIOR TO DISCHARGE.

P295

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Purpose/Background: The surgical community has a clear role in the opioid epidemic, with overprescribing contributing to new opioid dependence and misuse. There is an urgent need for better predictive strategies and guidelines to minimize overprescribing of opioids while ensuring adequate pain management. The objectives of our study were: (1) to describe opioid use after discharge for patients undergoing major colorectal surgery, and (2) to assess the relationship between inpatient opioid use in the 24 hours prior to discharge and outpatient opioid use after discharge.

Methods/Interventions: Chart review was conducted for all patients that underwent an inpatient major colorectal procedure at a single institution from April-June 2018. We recorded all opioid use in the 24 hours prior to discharge then converted to morphine milligram equivalents (MME) to facilitate division of patients into quartiles of opioid use. Opioids prescribed at discharge were normalized to 5mg oxycodone pills. At the first postoperative clinic visit, patients were surveyed regarding opioid use after discharge. Analysis of variance was used to compare mean opioid use post-discharge between patients in each quartile of pre-discharge use. Logistic regression determined the association between pre-discharge and post-discharge opioid use.

Results/Outcome(s): We identified 63 patients who underwent an inpatient major colorectal procedure during the study period and completed the survey regarding

post-discharge opioid use. Overall, patients used an average of 32.2 MME in the 24 hours prior to discharge (range 0-165) and were prescribed an average of 22.4 pills at hospital discharge (range 0-90). Almost half of patients did not use any opioids in the 24 hours prior to discharge (42.9%, n=27). The vast majority of these patients did not use any opioids after discharge (85.2%, n=23), though over half of patients were given an opioid prescription (55.6%, n=15, range 5-30 pills). Among patients who did use opioids prior to discharge (n=36), 77.8% took opioids after discharge (n=28). Patients in the lowest quartile of pre-discharge opioid use did not use any opioids in the 24 hours prior to discharge. Among these patients, only one used any opioids after discharge (6.3%). Patients in the highest quartile of pre-discharge opioid usage took an average of 96 MME in the 24 hours prior to discharge (range 60-165). After discharge, these patients took an average of 27.3 pills (range 0-85). Patients in increasing quartiles of pre-discharge opioid use took significantly more opioid pills post-discharge (p<0.001). For every milligram increase in MME taken pre-discharge, the likelihood of post-discharge opioid use increased by 3% (p<0.001). On average, there was an excess of 12 unused opioid pills per patient (range 0-75).

Conclusions/Discussion: We identified wide variation in opioid use in the 24 hours prior to discharge following major colorectal surgery, as well as in opioid prescribing and use after discharge. Patients who required larger amounts of opioids prior to discharge were more likely to use a larger number of opioid pills after discharge. These results argue against a one-size-fits-all strategy to postoperative opioid prescribing and demonstrate the need for a tailored approach that takes into account opioid usage prior to discharge. Such a strategy would ensure adequate postoperative pain management while reducing the supply of excess opioids available for potential diversion toward misuse in the community.

CURRENT STATUS OF ROBOTIC COLORECTAL SURGERY IN AUSTRALASIA: A QUESTIONNAIRE SURVEY OF CONSULTANT MEMBERS OF THE CSSANZ.

P296

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Purpose/Background: Internationally the application of robotic surgery has gained popularity within the colorectal sphere, most notably for rectal surgery. The Society of American Gastrointestinal Surgeons and Endoscopists (SAGES) has produced a consensus statement on robotic gastrointestinal surgery. The position statement indicates that the greatest potential benefit of the application lies in single quadrant surgery where there is a complex reconstructive component with a need for complex suturing

and fine dissection. It also acknowledges that a technically exceptional laparoscopic surgeon may derive minimal benefit from such a platform and that a robotic platform might rather serve as an enabling technology allowing surgeons to bring complex minimally invasive procedures to a greater number of patients. Although robotic colorectal surgery was first described in 2001, the uptake and establishment of the technique in Australasia has taken considerable time. Cited factors include cost, availability of the platform and availability of a suitable training pathway. Only limited information about robotic surgery is available from trial data and the ROLARR (Robotic-Assisted vs Conventional Laparoscopic Surgery on Risk of Conversion to Open Laparotomy Among Patients Undergoing Resection for Rectal Cancer) trial, which compared robotic surgery to laparoscopy and concluded that the robotic approach was not cost effective due to increased operating times and costs associated with robotic instrumentation. The robotic group achieved marginal improvements in quality of life indices resulting in a high incremental cost effectiveness ratio for the robotic technique and an overall conclusion that robotic surgery is not cost effective when compared with laparoscopy. Nonetheless there remains considerable interest in the technique and many believe that it is very valuable particularly in specific operations such as ventral mesh rectopexy and ultra-low rectal cancer surgery. Given the ongoing interest, despite the lack of current high quality evidence and the aforementioned barriers, we aimed to evaluate the current practice of robotic colorectal surgery amongst specialist colorectal surgeons in Australasia.

Methods/Interventions: Method: A questionnaire was emailed to consultant members of the Colorectal Surgical Society of Australia and New Zealand (CSSANZ), which currently number 227. Participation was voluntary. The questionnaire requested information from members on the practice of robotic colorectal surgery. Each invitation was accompanied by a 3 digit random number, which was recorded with the response so as to avoid the potential for duplication. Questions were asked about the types of surgery being performed robotically and the number of such surgeries. Information was also sought around training, proctorship, scope of non-robotic minimally invasive colorectal surgery being performed, access to robotics, involvement of trainees, perception of strengths and disadvantages of robotic techniques and perceived needs and pressures to perform this type of surgery. Responses were then collated and analysed and presented as descriptive statistics.

Results/Outcome(s): 77 replies were received from a total of 227 surveys. Most surgeons performed laparoscopic surgery, however, only 29% performed any robotic surgery and 50% of these performed less than 5 cases in the preceding 12 months. 11 surgeons (30% of the robotically active group) performed 10 or more cases in the preceding 12 months with 2 surgeons performing in

excess of 50 cases. Nine robotic surgeons acknowledged involvement of a fellow in their robotic practice. 22% of the total respondents indicated that they identified external pressure to perform robotic surgery and cited it as coming from the following sources: colleagues (76.5%), industry (47.1%) and patients (17.6%). 48% of surgeons believed the robotic platform offers specific patient benefits and 75% believed it offers specific benefits to the surgeon. Low rectal cancer and rectopexy surgeries were the most frequently performed robotic operations. Overall 48% of total respondents did work in at least one institution where there was access to robotics. The main reason for consultants not performing robotic procedures was largely related to cost, with training also cited as a barrier.

Conclusions/Discussion: Robotic colorectal surgery is being performed by 29% of colorectal consultants in Australasia, although only a minority of these surgeons have a substantial volume. In the future a substantial reduction in costs is envisaged, as more companies enter the robotic surgery marketplace and competition drives reduction in costs. This in many ways mirrors the introduction of laparoscopy and we believe as cost comes down, training pathways need to be established to train the next generation of colorectal surgeons robotically.

UPTAKE OF A TELEHEALTH PEER SUPPORT PROGRAM FOR STOMA PATIENTS.

P297

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Purpose/Background: Colorectal surgery for benign and malignant conditions commonly results in the formation of an excretory stoma with population prevalence rates as high as 2-4 per thousand (1). Ostomates are prone to complications, including acute kidney injury (AKI) and hospital readmissions. Impaired quality of life (QOL) is commonly reported, particularly in the early postoperative period. In a systematic review of quality of life in colorectal cancer stoma patients, all studies demonstrated that living with a stoma influenced the overall QOL negatively. Painful or irritated peristomal skin, odor and a sense of loss were the most commonly reported ostomy-related difficulties (2). Interventions to aid self-management in stoma patients have been effective in reducing readmission and dehydration-related complications (2). Peer support programs offer a method to manage the complex factors involved in chronic disease management and significant benefits to patients have been reported in over 86% (3). A recent study demonstrated that a self-help ostomy survivorship intervention is affordable and effective (7). Whilst stoma care nurses provide a great deal of formal and informal patient support, peer support from other patients can be vital to aid in the adjustment. We aimed

to evaluate a novel remote peer support programme for new ostomates.

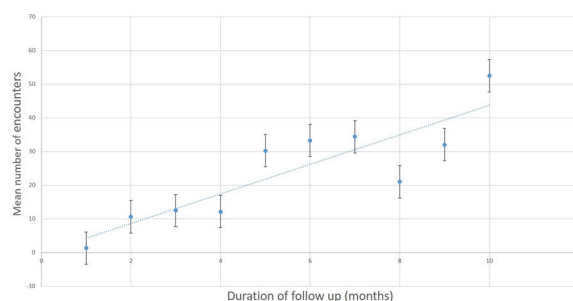
Methods/Interventions: As part of a remote quality improvement program for new stoma patients, consecutive new patients from multiple centres in the United States were recommended by their usual clinical team to a support service. Patients were paired with a ‘patient coach’ (a stoma patient) who contacted them weekly by telephone, email or messaging app to offer support and assistance. Coaches are trained to deliver support using their own experience for common stoma-related issues including health-related topics (hydration, nutrition, physical activity); social support topics (living with a stoma, intimacy, quality of life); stoma-appliance support (barriers, creams and products) and technical support (the platform through which telehealth interventions are delivered).

Results/Outcome(s): 25 patient coaches (20 female) were recruited via stoma support groups and social media between April 2017 and August 2018. All were either current or previous stoma patients. 77% had a background of inflammatory bowel disease. The cohort had experienced a wide range of current and previous stoma issues and 92% had one or more active medical comorbidity. 99 patients (53% female) were supported by coaches between October 2017-August 2018. The mean age of supported patients was 43 and 100% were ileostomy patients. The mean duration of follow up for a coaching relationship was 3.27 months with a mean number of coaching encounters per patient of 13.9. The support delivered in a number of key domains (social, health-related, stoma appliance-related and technical) during each coaching relationship was evaluated by review of the freetext coaching documentation. When a coaching relationship lasted for up to 10 encounters, 88% of patients were supported in one or more areas. When a relationship exceeded, 11 encounters 100% of patients were supported in one or more area. All patients with coaching relationships lasting beyond 30 encounters were supported in all 4 domains.

Conclusions/Discussion: Recent research has suggested that improvements in patient autonomy levels can be maintained over time and are associated with better self-management and lower use of healthcare services (3). The ‘Patient Coach’ peer support program is designed to connect new patients to experienced peers to promote shared experiences and prompt improved patient autonomy. Coaches’ medical background and demographics was broadly representative of the patients they were supporting. The uptake of telehealth coaching was positive, and the support was demonstrated to be acceptable to patients. Care was delivered in several important areas of patient need. The length of time over which patients remained in contact with their coach suggests that the response was durable. Peer support programs are known to be beneficial and could be expected to improve patient outcomes. Further evaluation will monitor the barriers to access and the

impact of such a program on quality of life and autonomy.

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The association of duration of coaching follow up with the number of coaching encounters successfully completed.

IMPLEMENTATION OF LIPOSOMAL BUPIVACAINE TRANSVERSUS ABDOMINIS PLANE BLOCKS FOR COLECTOMY AND ILEOSTOMY REVERSAL INTO THE ENHANCED RECOVERY PROTOCOL.

P298

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Purpose/Background: Enhanced recovery programs (ERP) are now standard of care for colorectal surgery. Efforts have been aimed at decreasing opioid consumption with multimodal pain management. However, the optimal perioperative pain management regimen has not yet been determined. The goal of this study is to evaluate the effect of liposomal bupivacaine transversus abdominis plane (TAP) blocks on opioid use and its downstream effect on rates of ileus and delirium as well as hospital length of stay.

Methods/Interventions: We performed a single-institution retrospective pre- and post-intervention analysis (2016-2018) of local infiltration with marcaine versus liposomal bupivacaine TAP blocks with a primary end point of total morphine milligram equivalents (MME) in the first 72 hours after surgery. Secondary outcomes included rates of ileus and delirium, as well as hospital length of stay. An institutional American College of Surgeons’ NSQIP database and an internal database were utilized to identify patients. ERP patients undergoing laparoscopic colectomy or ileostomy reversal were included

in the study. Univariable and multivariable analyses were carried out to determine if TAP blocks were associated with the primary and secondary endpoints.

Results/Outcome(s): 384 patients underwent laparoscopic colectomy or ileostomy reversal with 98 patients in the post-intervention group and 286 patients in the pre-intervention group. Patients in the post-intervention group used 29.3% less MMEs compared to patients in the pre-intervention group (64.6 ± 73.9 MME vs. 91.4 ± 98.4 MME, $p = 0.005$). The rate of ileus decreased by 66.4% (4.1% vs. 12.2%, $p = 0.02$) and the rate of delirium was unchanged (3.1% vs. 1.0%, $p = 0.18$). Hospital length of stay was reduced by more than one day after implementation of liposomal TAP blocks (2.9 ± 2.0 days vs. 4.0 ± 3.4 days, $p < 0.001$). Multivariable logistic and linear regression demonstrated that the administration of TAP blocks was independently associated with decreased total opioid use ($p = 0.03$), ileus ($p = 0.03$), and hospital length of stay ($p = 0.004$).

Conclusions/Discussion: In a pre-post analysis, the addition of liposomal bupivacaine TAP blocks into the ERP protocol resulted in significantly reduced opioid use, lower rates of ileus, and shorter hospital length of stay. Liposomal bupivacaine TAP blocks should be included in the standard ERP protocol.

MINIMAL EFFECT OF UNIVERSAL EXTENDED PROPHYLAXIS ON RATES OF VENOUS THROMBOEMBOLIC EVENTS AFTER COLORECTAL SURGERY IN A TERTIARY CARE CENTER. IS COMPLIANCE THE PROBLEM?

P299

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Purpose/Background: Despite recent emphasis on reducing rates of venous thromboembolic events (VTE) in post-operative patients, VTE continues to be a major source of morbidity following colorectal surgery. Several studies have demonstrated that extended duration VTE prophylaxis following hospital discharge with enoxaparin decreases the incidence of VTE in high risk patients. The American College of Chest Physicians (ACCP) guidelines now recommends post discharge anticoagulation in high risk patients for the prevention of VTE. However, it is well acknowledged that provider and patient adherence to these guidelines is incomplete. There is increased understanding that most, if not all, colorectal surgery patients represent a high-risk population for VTE. Therefore, the purpose of this quality improvement project was to determine if universal post discharge use of enoxaparin after colectomy or proctectomy could decrease the rates of VTE's.

Methods/Interventions: This is a prospective quality improvement project of patients undergoing elective

surgery within the division of Colon and Rectal Surgery at a large academic medical center. All patients undergoing colectomy or proctectomy between November 1, 2017 and October 31, 2018 were discharged with 30 days of enoxaparin injections. Patients already on systemic anti-coagulation prior to surgery were excluded. Patients subsequently underwent phone survey to evaluate adherence to the 30 day course. In cases of non-completion, total injections, frequency, and reasons for non-adherence were gathered. Using institutional quality improvement databases, rates of VTE during the period universal VTE prophylaxis were compared to previous years when only selective high risk patients (history of VTE, inflammatory bowel disease, cancer, obesity or pelvic surgery) received extended VTE prophylaxis. Multi-variable logistic regression was carried out to examine for independent predictors of non-adherence. Statistical significance was defined as $p < 0.05$.

Results/Outcome(s): A total of 220 patients received extended prophylaxis during the study period. Five thromboembolic events were recorded (1.85%) and there was no significant difference in rates when compared to previous years of selective prophylaxis for high risk patients (1.26% for 2016, 2.32% for 2017, (Fig 1). There was no significant difference in pre-operative diagnosis or procedures performed between years. Overall 146 patients (66%) completed phone survey and only 93 patients (64%) from this group reported completion of full course of enoxaparin. From those who did not complete full course of treatment, vast majority (50 patients, 96% of non-compliant patients) completed more than 50% of the total course, but only 35 patients (68%) completed 75% or higher of the total length of treatment. Patients reported difficulty with administering injection (37 patients, 71%) and pain with injections (23 patients, 44%) as reasons for non-adherence to the full regimen. There was no difference in rates of DVT/PE between patients who completed full course and not, although overall numbers were very low. Those at higher risk for non-adherence included older patients ($p = 0.022$), patient with a history of DVT/PE ($p = 0.054$), a cancer diagnosis ($p = 0.033$) and higher Charlson Comorbidity Index ($p = 0.033$). Patients with a longer length of stay ($p = 0.021$) were more likely to be compliant post discharge. There was one significant bleeding event leading to readmission and blood transfusion among all patients during the universal prophylaxis period.

Conclusions/Discussion: Universal use of extended duration enoxaparin prophylaxis in post-operative colorectal surgery patients is safe, but does not decrease rates of thromboembolic events when compared to selective use in high risk patients. High rates of non-adherence, especially in high risk patients are likely a significant contributing factor. Further studies into improving patient education and finding alternative routes of prophylaxis may help reduce rates of post-operative VTE.

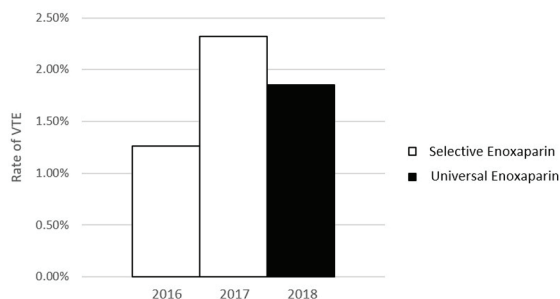


Figure 1: Rate of VTE within 30 days follow-up after elective colorectal surgery

Figure 1: Rate of VTE within 30 days follow up after elective colorectal surgery

VENTRAL RECTOPEXY IN RECTAL PROLAPSE BY POPS-OP AFTER LONGO MODIFIED BY HOSSEINI-PAKRAVAN - GOOD RESULTS IN SHORT-TERM FOLLOW-UP.

P300

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Purpose/Background: Numerous abdominal and perineal procedures were presented for surgical treatment of rectal prolapse. The aim of this study is to present the results of a new technique after a short follow-up.

Methods/Interventions: The POPS-Operation (Pelvic Organs Prolapse Suspension) was introduced by Longo. With the help of a polypropylene mesh fixed on the vaginal stump or on the proximal vaginal wall, which is fixed on both sides in the area of the spinae iliaca anteriores superiores, the organs of the pelvic floor are raised. In the modification according to Hosseini and Pakravan, the mesh is not fixed to the vagina, but ventral to the rectum and thus leads to an elevation of the rectum cranio-ventrally thus eliminating the rectal prolapse. Patients were asked about their symptoms postoperatively using a questionnaire.

Results/Outcome(s): 35 patients were operated in the technique presented. All patients were female. The median age was 68 (43-87) years. The follow-up period was 13.8 (1-25) months. All patients had rectal full-thickness prolapse. Thirteen patients (35.8%) reported regular bleeding, 20 patients (57.2%) had a disturbing or foreign body sensation, and 20 patients (57.2%) reported faecal incontinence. 25 patients (71.4%) had problems with defecation. Postoperatively, 13 patients (37.1%) experienced a marked improvement, 17 patients (48.6%) a strong or complete improvement. 4 patients (11.4%) reported only mild improvement of their symptoms. In the follow-up survey, 27 patients (77.1%) reported a persistent improvement of their symptoms. 2 patients reported having experienced increased pain since surgery. In 4 patients (11.4%) the prolapse had recurred. Fecal incontinence persisted in 12 patients (12/20 patients, 60%). The question whether they

would have the operation performed again was answered by 28 patients (80%) with yes and 6 (17.1%) with no.

Conclusions/Discussion: The POPS OP after Longo modified by Hosseini and Pakravan is an option in the surgical treatment of rectal prolapse with good results in the short-term follow-up.

TRANSVAGINAL RECTOPEXY USING THE FLEX® COLORECTAL DRIVE ROBOTIC SYSTEM: A PROOF-OF-CONCEPT APPROACH TO RECTAL PROLAPSE.

P301

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Purpose/Background: Rectal prolapse is a full-thickness protrusion of the rectum through the anus, most commonly seen in elderly women. Approaches to address this pathology can be broadly divided into abdominal or perineal procedures. While the abdominal approach is known for decreased recurrence rates due to the ability to perform a sacral rectopexy, it is also associated with greater morbidity; conversely, the perineal approach, while less morbid and potentially more tolerable for older individuals, has a higher recurrence rate. The purpose of this work is to demonstrate a proof-of-concept approach that would provide the durability of the transabdominal procedure through use of sacral rectopexy with the decreased morbidity of a perineal procedure. This is done by utilizing a transvaginal approach and developing the rectovaginal septal space to accommodate sacral rectopexy placement using the Flex® Colorectal Drive Robotic System by Medrobotics (Medrobotics, Corp. Raynham, MA, USA). By performing this procedure in a cadaver, we aim to demonstrate its feasibility as a potentially superior surgical approach to rectal prolapse.

Methods/Interventions: A fresh female cadaver was acquired and placed in the high lithotomy position. A curvilinear incision was made at the posterior vaginal wall and the rectovaginal space was developed to accommodate the trocar of the Flex robot using blunt and sharp dissection between the posterior vaginal wall and anterior rectum. Once adequate dissection was attained, a purse string suture was placed at the rectovaginal orifice and the Flex® robot was docked. Insufflation was achieved and maintained in the developed space to 15mmHg. Using the Flex® scissors and Maryland dissectors, the dissection was carried superiorly until the sacral promontory was encountered, approximately 17cm. A minor 0.5cm defect was created in the peritoneum during the dissection, however insufflation was not compromised during the procedure and pneumoperitoneum did not result. A piece of mesh was introduced into the space and using an endoscopic tacker, was secured to the sacral promontory. The Flex® robot was then disengaged from the cadaver and the

mesh was secured to the anterior rectal wall using interrupted vicryl sutures. The purse string suture was removed and the rectovaginal orifice was closed using a running vicryl suture. At the completion of the procedure, a low midline laparotomy was conducted to verify anchoring of the mesh appropriately at the sacral promontory.

Results/Outcome(s): This proof-of-concept protocol is the first description of the Flex[®] Colorectal Drive being used successfully to perform a transvaginal rectopexy for rectal prolapse in a cadaver. This is also the first description of the Flex[®] Colorectal Drive robot being used transvaginally.

Conclusions/Discussion: This proof-of-concept approach demonstrates that transvaginal rectopexy using the Flex[®] Colorectal Drive is a potential surgical option to address rectal prolapse that could provide patients the durability of a transabdominal approach with the decreased morbidity of a perineal approach. This project also demonstrated the first successfully described transvaginal application of the Flex[®] Colorectal Drive robot. While early results are promising, additional cadaveric studies are required before this procedure can be attempted in vivo.

VENTRAL MESH RECTOPEXY VERSUS SUTURE RECTOPEXY FOR RECTAL PROLAPSE: OUTCOMES AND FACTORS RELATED TO RECURRENCE.

P302

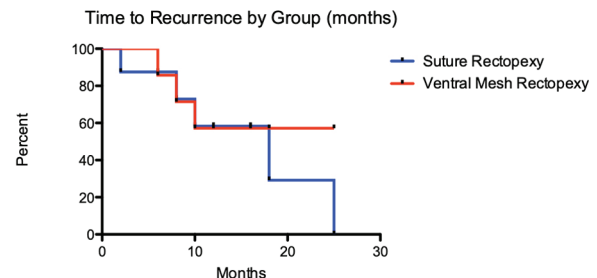
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Purpose/Background: Rectal prolapse is a debilitating pelvic floor disorder that requires surgical management to restore anatomy, function, and quality of life. Surgery is the main form of treatment, with the operative procedure dictated by the patient's comorbidities, age, bowel function, and the surgeon's preference and experience. Ventral mesh rectopexy (VMR) has emerged as the standard of care for patients undergoing repair through an abdominal approach. Little study has been done comparing outcomes for VMR with suture rectopexy (SR), which is still commonly performed, at the institutional level. Our goal was to evaluate the long-term outcomes for VMR versus SR, and variables associated with recurrence.

Methods/Interventions: A review of a prospective divisional database at a tertiary referral center was performed for rectal prolapse patients that underwent surgical repair through an abdominal approach between 1/1/2013 and 7/1/2018. Patients were stratified into VMR and SR groups, then matched 1:1 to increase comparability. Within each cohort, patients were divided into open, laparoscopic, and robotic approaches. The main outcome measures were the post-operative complications, recurrence and management, time to recurrence, and patient factors associated with recurrence by approach.

Results/Outcome(s): 60 patients (30 VMR, 30 SR) were included in the analysis. Patients were well-matched in age, gender, BMI, and co-morbidity. The main symptoms were fecal incontinence for SR (27%) and obstructive defecation for VMR (67%). Both cohorts had chronic symptoms prior to surgery (mean 52.17 months SR, 133.68 months in VMR). Four (13%) SR and seven (23%) VMR patients had prior prolapse treatment. The approach was primarily laparoscopic for SR (50%) and robotic for VMR (100%). Postoperatively, 13% (n=4) were readmitted and 17% (n=5) had a recurrent prolapse in each group. The time to recurrence was significantly shorter with VMR than SR (4.4 vs. 12.6 months). Nine patients had repeat surgery for recurrence (1 was unfit); the main treatment for recurrence in both groups was a robotic VMR.

Conclusions/Discussion: While the overall rate of recurrence was similar across approaches, the time to recurrence was significantly faster with a robotic VMR. Patients with longer duration of symptoms and obstructive defecation were more prone to recurrence; all patients that had a prior Altemeier repair recurred regardless of procedure performed. While our study had a small sample size, these findings show variables prone to recurrence and possibly surrogates for high recurrence patients. Further controlled study is underway to validate these findings.



RETAINED COLONIC TRANSIT MARKERS IN THE APPENDIX - A CLINICAL DILEMMA.

P303

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Purpose/Background: Colonic transit studies utilizing sitz markers have long been the standard of care to evaluate intestinal transit time. It was first described in 1969 by Hinton et al and has since been widely utilized to evaluate colonic dysmotility. Generally, one single capsule is ingested which breaks down to release twenty - four radiopaque markers whose location can subsequently be identified by x-ray. The retention of more than 20% of the markers five days after ingestion is suspicious for colonic inertia. There are no documented side effects or complications secondary to this study. In an extensive review of the literature there is only one documented case of sitz markers being retained in the appendix causing appendicitis. In our case report, we present both a patient that had multiple

sitz markers lodged within her appendix following a colonic transit study plus the utilization of a bowel prep to clear the majority of the markers after identification.

Methods/Interventions: Our patient is a 41 year – old female who initially presented to the office for incomplete evacuation of stool affecting her quality of life. She had a defecography study which demonstrated inability to evacuate the rectal vault in addition to a small rectocele. In order to evaluate for slow colonic transit, a sitz marker study was planned. The colonic transit study was performed utilizing standard protocol and on the day five x-ray there were multiple sitz markers aligned in a linear fashion in the right lower quadrant (Image 1). A CAT scan of the abdomen and pelvis was performed to further identify the anatomy. Once the location of the markers was confirmed, the patient received a bowel prep in order to evaluate whether the sitz markers could be flushed out of the appendix.

Results/Outcome(s): The CAT scan of the abdomen and pelvis did demonstrate multiple sitz markers within the appendix without any evidence of appendicitis. After the administration of the bowel prep, a subsequent x-ray of the abdomen demonstrated a singular sitz marker within the appendix.

Conclusions/Discussion: In our experience, we demonstrate that no singular test or study comes without risk or complications even if previously unknown or not well described. We have demonstrated that the utilization of a bowel prep can successfully clear the majority of the sitz markers from the appendix in the setting of an asymptomatic patient with no radiologic evidence of appendicitis. At this time the clinical significance of the remaining sitz marker is unknown and only time will tell.



Day Five X-ray

“IT WAS MY DECISION”: A QUALITATIVE ANALYSIS OF SURGICAL DECISION-MAKING IN PATIENTS WITH ULCERATIVE COLITIS.

P304

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Purpose/Background: Up to 30% of patients with ulcerative colitis will need surgery resulting in an ileal pouch-anal anastomosis (IPAA) or permanent end ileostomy (EI). However, little is known about the decision-making process from the perspective of patients. Understanding this process will lead to improved decision support for this patient population.

Methods/Interventions: This study consisted of semi-structured interviews with adult patients with ulcerative colitis who underwent surgery in the preceding 6-18 months. The goal was to gain insight into the experience during decision-making between IPAA and EI. Areas of questioning included the degree to which patients participated in decision-making, challenges experienced, and suggestions for improving the decision-making process. A directed content and thematic approach was used to analyze interview data

Results/Outcome(s): The study population consisted of 16 patients ranging in age from 28-68 years. Nine were male, 10 underwent IPAA, and 6 underwent EI. When it came to participation in decision-making, 11 patients reported that they felt independently responsible, 3 shared decision-making with the surgeon, and 2 experienced surgeon-led decision-making. Surgeon-led decision making was used in cases where the surgeon felt the chance of pouch failure was high due to indeterminate colitis (N=1) or low sphincter tone (N=1). Challenges during decision-making included lack of support from family members who did not agree with the patient’s decision (N=3), lack of time to discuss options with the surgeon (N=2), and the overwhelming complexity of the decision (N=2). When discussing ways to improve decision-making, 9 patients desired additional information, including information in general (N=5), regarding complications (N=2), about the severity of disease (N=1), and about life after surgery (N=1). Two patients wished they had the opportunity to talk with others who had been through surgery, and one desired earlier consultation with a surgeon. Only three patients were overall content with the information they used to decide about surgery.

Conclusions/Discussion: Patients with ulcerative colitis who need surgery largely experience independence when deciding between IPAA and EI, but struggle with social support and dealing with the complexities of decision-making. Patients may benefit from access to reliable resources, including other surgical patients, to support their independence in decision-making. Educational tools could be tailored so that they can be used to facilitate discussions with loved ones.

ONE STAGE RESTORATIVE PROCTOCOLECTOMY WITH A STAPLED ILEAL POUCH-ANAL ANASTOMOSIS USING HAND-ASSISTED LAPAROSCOPIC SURGERY (HALS) AND LAPAROSCOPE-ASSISTED OPEN SURGERY (LAOS) PROCEDURE FOR ULCERATIVE COLITIS.

P305

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Purpose/Background: This study aims to evaluate the effectiveness of hand-assisted laparoscopic surgery and laparoscope-assisted open surgery (HALS and LAOS) procedure for one stage restorative proctocolectomy with a stapled ileal pouch-anal anastomosis in patients with ulcerative colitis (UC).

Methods/Interventions: The medical records of 295 patients who had undergone primary surgery for UC between 2007 and 2017 in our institution were retrospectively reviewed. We have selected one stage (without diverting ileostomy) restorative proctocolectomy with a stapled ileal pouch-anal anastomosis for intractable UC without severe rectal or anal disease. One stage surgery was performed in 133 patients (45%) in this period. We standardly choose HALS and LAOS procedure (117 patients) for one stage surgery. Colectomy was performed with HALS and rectal resection was performed with LAOS. Conventional open surgery (OS) (16 patients) was used

only for patients who had an emergency surgery, or patients with severe comorbidity. Patients were divided into two groups according to surgical procedures. Outcomes were compared between groups.

Results/Outcome(s): The length of skin incision was significantly shorter in the HALS group (7 vs 13 cm; $P < 0.001$), and the median operative time was significantly longer in the HALS group (285 vs 248 minutes; $P < 0.004$). There were no significant difference regarding blood loss (254 vs 251 g; $P = 0.683$), surgical complications within 30 days postoperatively (11 vs 2 patients; $P = 0.696$), and hospital stay after surgery (17 vs 19 days; $P = 0.190$).

Conclusions/Discussion: HALS and LAOS procedure was safe and easy with minimal skin incision for one stage restorative proctocolectomy with a stapled ileal pouch-anal anastomosis for UC.

THE LONG-TERM DIAGNOSTIC DELAY IS COMMON AMONG PATIENTS WITH CROHN'S DISEASE IN EASTERN CHINA—A COHORT MULTI-CENTER STUDY.

P306

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Purpose/Background: Background: Misdiagnosis and mistreatment will bring the higher cost, lower quality of life, poorer prognosis and even form an irreversible outcome. Therefore, timely diagnosis and proper treatment

P304 Representative quotes from patients regarding surgical decision-making for ulcerative colitis

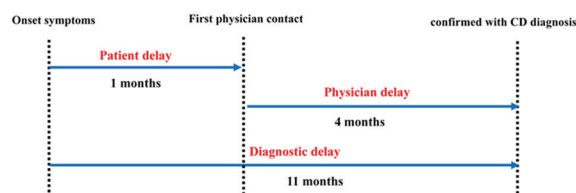
Category	Theme	Representative Quote
Participation in decision-making	Patient-led	"I think I had it pretty good, in terms of decision time, and options, and the ultimate responsibility to make that decision by myself. I didn't feel as though I was between a rock and a hard place. I could choose either way, and everybody involved would be completely fine with that."
	Shared with surgeon	"I would definitely like to get all the information possible from the surgeon...and I would like to bring my thoughts into it, and have a back-and-forth conversation about it."
	Surgeon-led	"I deferred totally to [the surgeon]. At that time, I hadn't researched enough. I didn't know enough."
Challenges in decision-making	Lack of support	"My mom tried to talk me out of [an ileostomy]...she thought my relationship with my husband would change, you know, sexually. You have to be able to be comfortable and make the decision for yourself and not let other people influence your decision-making."
	Lack of time with surgeon	"I did feel that sometimes it was a bit rushed. And I could understand that, given that [the surgeon] has many patients that she needs to see and attend to and so on, but I don't think there was a specific question I didn't get an answer to."
	Complexity of decision	"My ability to process the information was so limited because it was so overwhelming, and there was so much of it."

are essential for the management of Crohn's disease (CD). However, the diagnostic delay (time from first symptoms to confirmed diagnosis) of CD in China is poorly understood. **Aims:** The study aimed to gain insight into the current situation of diagnostic delay of patients with CD in eastern China.

Methods/Interventions: Methods: This cohort study was conducted at three tertiary hospitals in eastern China. A validated questionnaire about the experience of CD was designed and QR code of this questionnaire was sent to the patients in a social media based IBD management community (Wechat) from Feb to Jul 2018. All the data of responded questionnaires were collected, including patients' demographic data (name, gender, age, smoking history, education degree), information about the initial symptoms and time of occurrence, the time and initial diagnosis of first physician contact, and definite diagnostic information (time, hospital degree, diagnostic methods, the initial medical treatment), number of doctors referred between first physician contact and confirmed diagnosis of CD.

Results/Outcome(s): Results: Two hundred and eighteen patients with confirmed CD between 2004 to 2018 were involved in our study. Weight loss (32.1%), fatigue (24.1%), anemia (17.2%) and fever (19.1%) were major complains at first physician visit. While the intestinal was the most common initial disease location (106/218, 74.7%), followed by perianal lesions (97/218, 44.5%) and extraintestinal disease (15/218, 6.9%) at first physician visit. At first contacted with physicians, only 72 (33.0%) were diagnosed with CD, and others were misdiagnosed as ulcerative colitis (32/218, 14.7%), gastritis/colitis/IBS (33/218, 15.1%), tuberculosis/tumors/appendicitis (47/218, 21.6%), unknown (34/218, 15.6%). Patients were referred to an average of 3.4 (range 1-19) physicians before being confirmed with CD diagnosis. The total diagnostic delay was 11 (0-220) months respectively between initial and definite diagnosis, the median patient and physician relevant delay duration was 1 (0-154) and 4 (0-277) months respectively. Among all the patient include, 85.8% (187/218) patients were diagnosed with CD at a tertiary hospital, and 14.20% (31/218) in the primary and secondary hospital. Colonoscopy and pathology is still the most commonly used diagnostic method (38.3%), others include CTE (22.8%), endoscopy or capsule endoscopy (18.0%), MRE (13.0%). The initial medical treatment after a definite diagnosis was 5-aminosalicylic acid (39.0%), followed by infliximab (20.7%), steroid (18.0%) and azathioprine (13.3%).

Conclusions/Discussion: Conclusions: At present, diagnosis and treatment situation of CD in China is not optimistic, the patients with CD had a long diagnostic delay in China. Education of CD-related knowledge should be disseminated strengthened to the physician in the primary and secondary hospitals and effective referral system should be established urgently.



Detailed time (median) of various delays

LOSS OF RUNT-RELATED TRANSCRIPTION FACTOR 3 (RUNX3) IMMUNOREACTIVITY IN NON-NEOPLASTIC RECTAL MUCOSA MAY PREDICT THE OCCURRENCE OF ULCERATIVE COLITIS-ASSOCIATED COLORECTAL CANCER.

P307

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Purpose/Background: Persistent mucosal inflammation in ulcerative colitis (UC) is well known to cause colorectal neoplasm, which is known as colitis-associated cancer (CAC) or dysplasia. To detect CAC at the early phase, surveillance colonoscopy is recommended for patients with extended and left-sided colitis 6–10 years from the time of onset. Stratifying patients according to the risk of developing CAC can increase the efficiency of surveillance programs. Runt-related transcription factor (RUNX)3 is a tumor suppressor whose expression is reduced in non-neoplastic rectal mucosa of patients with ulcerative colitis (UC) with coexisting colitis-associated cancer (CAC). In this study, we compared RUNX3 expression in non-neoplastic UC mucosa with and without CAC by immunohistochemistry (IHC) and evaluated its utility as a predictive marker for CAC.

Methods/Interventions: We retrospectively compared RUNX3 expression detected by IHC between non-neoplastic rectal biopsy specimens from 20 cases with invasive cancer (CAC group) and 20 cases without CAC (non-CAC group) that were treated during the same period (2006–2017) and were matched for sex, UC duration, UC extension, and age. We evaluated RUNX3 expression in non-neoplastic UC mucosa by immunostaining biopsy specimens from patients with and without concurrent CAC. We validated our findings by immunohistochemical analysis of a tissue microarray (TMA) comprising surgically resected specimens from non-neoplastic mucosa of patients with CAC, and evaluated the correlation between RUNX3 expression and patient characteristics. RUNX3 expression level was determined by calculating the percentage of RUNX3-positive-cells.

Results/Outcome(s): RUNX3 expression was lower in the CAC than in the non-CAC group (35.6% vs. 70.7%, $P = 0.03$). For a cut-off value of 58%, the sensitivity and specificity of RUNX3 immunostaining for predicting the occurrence of CAC were 75.0% and 70.0%, respectively.

The immunostaining results for the TMA showed the same trend; 26% of cases with CAC were positive for RUNX3 expression. Although there was no difference in mean age at the time of operation between groups, mean UC duration was significantly shorter in the RUNX3-positive group (12.7 ± 5.71 years) than in the RUNX3-negative group (20.0 ± 9.82 years) ($P = 0.03$). The majority of cases in both groups were classified as extensive colitis, and the tumor was located in the left-side colon (predominantly the sigmoid colon and rectum). There was no difference in CAC histology between groups.

Conclusions/Discussion: We previously reported that RUNX3 mRNA level was reduced in non-neoplastic mucosa of UC patients with CAC due to DNA copy number alterations. We also demonstrated the high predictive accuracy (82.9%) of RUNX3 DNA copy number for CAC with high AUC (0.85), suggesting that RUNX3 is a useful molecular marker for identifying patients at a higher risk of developing CAC. Other studies have shown that RUNX3 gene expression level is influenced by the hypermethylation of CpG islands in the promoter region, which is also associated with the development of colitis and carcinogenesis in UC. IHC is routinely performed in 9 medical laboratories and is considered more time- and cost-effective than DNA microarray analysis or RT-PCR. In conclusion, RUNX3 immunostaining of non-neoplastic rectal mucosa is useful for identifying UC patients at a high risk of developing CAC, which can lead to early intervention and improved prognosis.

A RETROSPECTIVE ANALYSIS OF LOW-GRADE APPENDICEAL MUCINOUS NEOPLASMS (LAMN) POST APPENDECTOMY.

P308

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Purpose/Background: Low-grade appendiceal mucinous neoplasms (LAMN) are non-invasive, mucinous tumors of the appendix that are frequently discovered incidentally after appendectomy. This typically indolent rare disease, which has been reported to progress to life threatening pseudomyxoma peritonei (PP) in some cases, has a paucity of data to help guide management. There is no consensus on the type of surveillance or need for additional surgery because it is unclear who will progress from LAMN to PP. As such, subsequent care for these patients ranges from nothing, to surveillance with frequent torso imaging, to aggressive operations with colectomies and even heated intraperitoneal chemotherapy. This is a retrospective review of 105 patients with LAMNs after appendectomy to determine risk factors for disease recurrence and progression to PP.

Methods/Interventions: After IRB approval, a retrospective review of the Southern California Kaiser Permanente database with more than 4.5 million patients was queried. All patients between 2008-2017 with an incidentally discovered LAMN after appendectomy were included. The electronic medical records of these patients were reviewed for demographics, operative reports, pathology results, long-term outcomes and post-operative surveillance patterns. Statistical analysis included multivariate analysis of demographic and pathologic factors and chi-square analysis comparing patients with a disease recurrence to those who did not have a recurrence was performed.

Results/Outcome(s): 105 patients with LAMN after appendectomy were evaluated and followed up for an average of 41 months (range 15 days – 123 months) after surgery. Patient demographics and comparison of patients with disease recurrence versus non-recurrence is demonstrated in **Table 1**. Preoperative CT scans were described as the following: 22.7% (n=22) as a dilated appendix, 16.5% (n=16) as appendicitis, 16.5% (n=16) as a mucocele, 16.5% as a cystic structure, 8.2% (n=8) as a mass in the pelvis or RLQ, 3.1% (n=3) as carcinomatosis and 6.2% (n=6) could not identify the appendix. 24.7% (n=24) measured the mass or appendix to be > 6cm while 6.2% (n=6) were > 11cm. The initial surgeries performed were as follows: 68.6% (n=72) appendicoectomy alone, 19% (n=20) right hemicolectomy or ileocectomy and 12.4% (n=13) appendectomy as part of gynecologic debulking surgery. During the initial operation, the following were identified: gross perforation 29.5% (n=31), gross mucus 42.9% (n=45), intraoperative spillage 30.5% (n=32) and pseudomyxoma 7.4% (n=8). Final pathology results demonstrated the following: presence of gross mucin on section 90.5% (n=95), epithelial cells 12.3% (n=14), benign neoplastic cells 16.2% (n=17), malignant cells 1.9% (n=2), perforation 32.4% (n=34), extraluminal mucin 38.1% (n=40), and extraluminal epithelial cells 2.9% (n=3). The average number of lymph nodes per specimen was 2.3 (range 0-25, n=26). There were no positive lymph nodes on final pathology and 13.3% (n=14) of patients had a positive margin. The rate of disease recurrence was 6.7% (n=7) and identified at an average of 27 months (26 days - 49 months) after initial surgery. Patients who had a recurrence were more likely to have a cystic structure or structure >11cm on preoperative CT scan (42.9% v 14.4%, $p = 0.05$; 4.4% v 28.6%, $p=0.01$), have gross mucus (85.7% v 38.5%, $p = 0.02$), intraoperative spillage (71.4% v 27.6%, 0.01) and pseudomyxoma (42.9% vs 5.3%, $p = 0.003$) as well as significantly higher rates of epithelial cells (42.9% v 11.2%, $p = 0.01$), malignant cells (14.3% v 1%, $p = 0.01$), perforation (85.5% v 28.6%, $p = 0.002$) and extraluminal mucin (85.7% v 34.7%, $p = 0.007$) on final pathology. There were no differences in the types of initial

surgeries performed or the number of patients who had a positive margin. 13 patients in the non-recurrence group underwent additional surgery, 10 of which had a positive margin. The additional surgeries included 5 cecectomies and 7 right hemicolectomie. Each group had 2 cases of mortality. One patient in the non-recurrence group passed away from ovarian cancer and the other due to an unrelated cause. 2 patients in the recurrence group died from appendiceal cancer at 50 and 53 months after surgery.

Conclusions/Discussion: LAMN is a rare disease with infrequent progression to PP. Predictors of patients at risk for PP include those with intraoperative mucus spillage, identification of pseudomyxoma during initial surgery as well as the presence of epithelial cells, malignant cells, perforation and extraluminal mucin on final pathology. These risk factors should prompt more careful surveillance and discussion of additional prophylactic operations. Patients without these risk factors would likely not benefit from additional operations nor surveillance.

OPEN VERSUS LAPAROSCOPIC COLECTOMY FOR SIGMOID VOLVULUS: A CASE-MATCH ANALYSIS FROM THE ACS NSQIP.

P309

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Purpose/Background: The prevalence of sigmoid volvulus is likely to increase in parallel with an increase in the aging population, underscoring our need to have more defined and universally accepted management strategies. Sigmoid colon resection following endoscopic decompression of sigmoid volvulus offers the lowest recurrence rate. To date, few studies address the role of laparoscopy as a definitive operative approach. Laparoscopic sigmoid resection may allow for easy mobilization of a redundant sigmoid loop and may be beneficial for elderly, debilitated patients with significant comorbidities. The goal of this study is to examine short-term outcomes, morbidity and mortality factors associated with open (OP) and laparoscopic (LAP) colectomy for sigmoid volvulus using the nationwide

P308 Comparison of Disease Recurrence vs. Non-Recurrence

	Total (n=105)	Non-Recurrence (n=98)	Recurrence (n=7)	p-value
DEMOGRAPHICS				
Female sex	67.6% (n=71)	66% (n=66)	71.4% (n=5)	0.82
Caucasian	42.9% (n=49)	44.9% (n=44)	71.4% (n=5)	0.17
Prior gynecologic neoplasm	4.8% (n=5)	4% (n=4)	14.3% (n=1)	0.22
History of prior cancer	18.1% (n=19)	16.3% (n=16)	42.9% (n=3)	0.08
Cancer risk factors	27.6% (n=29)	27% (n=27)	28.6% (n=2)	0.95
Body mass index	29.1	29.4	24.6	0.005
Symptoms of pain	65.7% (n=69)	65.3% (n=64)	71.4% (n=5)	0.74
OPERATIVE DATA				
Gross Perforation	29.5% (n=31)	27.6% (n=27)	57.1% (n=4)	0.1
Gross Mucus on section	42.9% (n=45)	38.5% (n=39)	85.7% (n=6)	0.02
Intraoperative Spillage	30.5% (n=32)	27.6% (n=27)	71.4% (n=5)	0.01
Pseudomyxoma	7.4% (n=8)	5.3% (n=5)	42.9% (n=3)	0.003
FINAL PATHOLOGY				
(+) mucin present on section	90.5% (n=95)	88.7% (n=88)	100% (n=7)	0.39
(+) epithelial cells	13.3% (n=14)	11.2% (n=11)	42.9% (n=3)	0.01
(+) benign neoplastic cells	16.2% (n=17)	16.3% (n=16)	14.3% (n=1)	0.89
(+) malignant cells	1.9% (n=2)	1% (n=1)	13.3% (n=1)	0.01
perforation	32.4% (n=34)	28.6% (n=28)	85.7% (n=6)	0.002
(+) extraluminal mucin	38.1% (n=40)	34.7% (n=34)	85.7% (n=6)	0.007
(+) extraluminal epithelial cells	2.9% (n=3)	1% (n=1)	28.6% (n=2)	n/a
goblet cells	1% (n=1)	0	14.3% (n=1)	n/a
# of lymph nodes	2.3 (0-25)	4.2 (n=23)	3 (n=3)	0.74
# of (+) lymph nodes	0	0	0	n/a
positive margin	13.3% (n=14)	13.2% (n=13)	14.3% (n=1)	0.87

database of the American College of Surgeons National Surgical Quality Improvement Project (ACS-NSQIP).

Methods/Interventions: CS-NSQIP database was queried from 2006-2012 for cases performed for the post-operative diagnosis of colonic volvulus by ICD-9 code and CPT codes inclusive for open and laparoscopic segmental bowel resections. CPT codes corresponding to proctectomy, proctocolectomy, right, and total abdominal colectomies were excluded to isolate sigmoid volvulus cases. LAP treated patients were matched to OP controls on a 1:1 basis. The matching criteria included ASA classification, Age, obesity, and emergency. A matched univariate analysis was performed to compare laparoscopic patients to controls. McNemar's test or Bowker's test of symmetry was used for categorical factors, Paired t-test of Wilcoxon signed rank test was used for continuous factors, and Wilcoxon sign-rank test was used for ordinal factors. All analyses were conducted using SAS (version 9.4, The SAS Institute, Cary, NC), and p-values <0.05 are considered statistically significant.

Results/Outcome(s): A total of 1,928 patients were included in the final sample, of which 360 were treated with laparoscopic surgery, and 1,568 were treated with open surgery. We successfully found a control for each laparoscopic case, resulting in 360 matched pairs, or a matched sample of 720. Patients in the OP group had more preoperative systemic sepsis (16% versus 8%, respectively, $p < 0.001$) and bleeding disorders (11% versus 6%, respectively, $p < 0.001$) than LAP group. Besides LAP surgeries were longer than OP surgeries (83 min. versus 110 min., respectively, $p < 0.001$), LAP was associated with a shorter postoperative length of stay (5 versus 7 days, $p < 0.001$), and lower postoperative morbidity (27% versus 20%, $p = 0.021$). There were no differences in the rate of stoma creation between the groups, nor wound classification or occurrence of surgical site infection (Figure 1).

Conclusions/Discussion: When feasible, LAP colectomy may reduce postoperative morbidity and provide faster recovery in patients that undergo colectomy for sigmoid volvulus when compared to open surgery. The presence of severe preoperative conditions (such as preoperative systemic sepsis and bleeding disorders), in addition to the operative approach used, may also affect the postoperative outcomes.

Figure 1. Demographics and perioperative characteristics of the matched sample

Factor	Open (N=360)	Laparoscopic (N=360)	p-value
Age	65 [51 - 80]	66.5 [52 - 79]	0.44
Total operation time	83 [66 - 121]	110 [84 - 150]	<0.001
Male	188 (52)	187(52)	1.0
Stoma	48 (13)	34 (9)	0.11
ASA classification >=3	175 (49)	175 (49)	1.0
Bleeding disorders	38 (11)	23 (6)	0.047
Systemic sepsis	58 (16)	28 (8)	<0.001
Total LOS (days)	9 [6 - 14]	7 [4 - 10]	<0.001
LOS -Postoperative (days)	7.0[5.0,11.0]	5.0[4.0,7.0]	<0.001
Mortality	16 (5)	14 (4)	0.71
Overall Postop Morbidity	96(26.7)	71(19.7)	0.021

LOS: length of stay
 Statistics presented as Mean \pm SD, Median [P25, P75], Median (min, max) or N (column %).
 p-values: Paired T-test, Wilcoxon signed-rank test, McNemar's test, Bowker's test of symmetry as appropriate.

THE UTILIZATION OF AN ABSORBABLE MESH AFTER OSTOMY REVERSAL DOES NOT DECREASE INCISIONAL HERNIA RATES.

P310

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Purpose/Background: Incisional hernia rates after ostomy reversal have been cited to be as high as fifty percent in the literature when physical exam is accompanied by radiographic imaging. Despite this there have been limited studies looking at the utilization of prophylactic mesh, either permanent or absorbable, likely due to the inherent contaminated nature of this case. In our study, we aim to evaluate the affect of placement of an absorbable mesh at the time of ostomy reversal, both ileostomy and colostomy, on incisional hernia rates at the stoma site.

Methods/Interventions: A single institution retrospective review of all ostomy reversals between January 2013 and July 2018 was performed. The primary outcome was incisional hernia occurrence at the ostomy site with and without the use of absorbable mesh. Secondary outcomes included surgical complications, superficial site infections, estimated blood loss, operative time, time to hernia occurrence and hospital length of stay. A power calculation was performed to determine the sample size needed to demonstrate a fifty percent clinical decrease in hernia rates between the two arms of the study.

Results/Outcome(s): A total of 303 patients underwent an ostomy reversal between January 2013 and July 2018 at our institution. Of these, 215 patients were eligible to be included in the study. The baseline demographics between the two groups were similar. Sixty-eight ostomy reversals included the placement of an absorbable mesh, and 147 ostomy reversals were closed primarily without mesh. A total of 27 (12.6%) incisional hernias at the stoma site were documented between the two groups. Seven occurred in the mesh group and twenty in the non-mesh group (p -value = 0.66).

Conclusions/Discussion: The utilization of an absorbable mesh placed at the time of ostomy closure does not decrease the rate of incisional hernias at the ostomy site. Continued research in this field is needed to help develop the best technique for ostomy closure to work on decreasing stoma site hernias.

PREVENTING READMISSION FOLLOWING ILEOSTOMY CREATION.

P311

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Purpose/Background: Ileostomy creation is a necessary and often lifesaving procedure routinely performed by colorectal surgeons. Readmission following creating an ileostomy has been a problem plaguing surgeons, hospitals

and patients for decades. The rates of dehydration have been reported to be as high as 19.3% and this corresponds with a readmission rate as high as 35%. Age, ileal pouch anal anastomosis, diuretics, and pre-existing renal dysfunction have all been linked to postoperative renal dysfunction and readmission. However, there has been limited investigation into the prevention of postoperative renal failure following ileostomy creation as a means of decreasing readmission. Recently at our institution, we introduced a new protocol for our ileostomy patients to prevent readmission. The protocol includes but is not limited to 64 ounces of electrolyte supplement per day, free water restriction to 500 ml per day, enterostomal therapist patient education on accurate ileostomy output and stoma care with daily milestones, and ostomy care booklet distributed to each patient. The purpose of this study was to review our colorectal surgery patients and identify those patients who underwent ileostomy creation over the last 3 years in order to determine our rate of readmission, high output ileostomy and acute kidney injury prior to institution of this new protocol.

Methods/Interventions: We performed a retrospective review of our colorectal surgery patients from August 1st, 2015 to August 1st 2018. We analyzed these patient's demographic data (age, race, sex, BMI), the indications for surgery (inflammatory bowel disease, cancer, etc), postoperative readmissions, acute kidney injury, high output, and complications.

Results/Outcome(s): We identified 6369 patients over this time period of which 98 patients underwent creation of a new ileostomy. The majority of our patients were female (55 patients, 56%), white (92 patients, 94%) and had a mean age of 55 years old. Thirty-eight of the procedures (39%) were performed for inflammatory bowel disease and 36 of the procedures (37%) were performed for cancer. Twenty-one procedures (21%) were performed on an emergent basis. Thirty-two patients (33%) had high output ileostomy (>1500ml per 24-hour period). Twenty-six patients (27%) were readmitted and 21 patients (21%) had acute kidney injury (increase in creatinine of 0.3 above baseline). Seventeen of the patients with inflammatory bowel disease (45%) had high output ileostomy, 12 (32%) were readmitted, and 10 (26%) had acute kidney injury. Only 9 of our cancer patients (25%) had high output ileostomy, 8 of them (22%) requiring readmission and 6 (17%) developed acute kidney injury. Ten patients who required an emergent ileostomy (48%) developed high output, with 5 patients (24%) requiring readmission and 5 patients (24%) developed acute kidney injury.

Conclusions/Discussion: Our findings are similar to previously reported rates of readmission following ileostomy creation (27% vs 16-35%) reflecting a nationwide predicament. Our data indicates these rates of high ileostomy output, acute kidney injury and readmission are correlated. Emergent ileostomies and patients with inflammatory

bowel disease are particularly at risk compared to elective operations and patients with cancer. Our results stress the importance of preventing dehydration and acute kidney injury in our ileostomy patients, especially those with high outputs. Going forward, we will compare this data to our patients under our new ileostomy protocol to determine its effectiveness at preventing dehydration, acute kidney injury and readmissions.

SINGLE-PORT LAPAROSCOPIC APPENDECTOMY FOR ACUTE APPENDICITIS DURING PREGNANCY.

P312

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Purpose/Background: Acute appendicitis is the most common non-obstetric surgical problem in pregnant patients. As minimally invasive surgery has developed, minimizing surgical trauma and improving cosmetic outcomes have led to the development of single-port laparoscopic surgery (SPLS). The aim of this study was to assess the feasibility and safety of SPLS for acute appendicitis during pregnancy.

Methods/Interventions: Between September 2014 and May 2016, 12 pregnant patients diagnosed with acute appendicitis and having single-port laparoscopic appendectomy were included in the study.

Results/Outcome(s): The median gestational age at surgery was 16 weeks (6-30 weeks). All operations were completed safely and without vascular or visceral injury. Four patients (33.3%) required conversion to a reduced-port laparoscopic surgery with 3 patients (25%) having a 5mm port inserted because of perforated appendicitis with a drain placement, and 1 patient (8.3%) having a 2mm needle instrument insertion. Median operation time was 60 minutes (32-100 minutes), and a drainage tube was placed in 5 patients (41.7%). Median total length of incision was 2.0cm (1.2-2.5cm). The median time to soft diet initiation and length of stay in the hospital were 1 day (0-9 days) and 5 days (2-11 days), respectively. Two patients (8.0%) developed postoperative complications: 1 wound site bleeding and 2 surgical site infections. One case of abortion (8.3%) was noted on postoperative day 1 and 1 case of imperforate hymen was noted after delivery.

Conclusions/Discussion: SPLS appendectomy is feasible and safe for treating patients with acute appendicitis during pregnancy.

IT'S NOT ALL HEMORRHOIDS: ANAL FISSURE AND FISTULA IN ANO ARE UNDERAPPRECIATED BY REFERRING PHYSICIANS.

P313

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Purpose/Background: Diagnosis and treatment of anorectal disease by non-surgeon physicians remains a challenge, with misdiagnosis being commonplace. A careful clinical examination is critical to make the correct diagnosis and recommend appropriate treatment. This study seeks to determine the agreement between provisional diagnoses by referring physicians and diagnosis by surgeons within a specialty clinic dedicated to assessment of patients with anorectal complaints.

Methods/Interventions: Consecutive patients assessed in a dedicated anorectal clinic (ARC) during the first 4 months of 2017 were reviewed. Patient age, gender, symptoms, physical examination findings, provisional diagnosis by referring physician, diagnosis by the ARC consultant, initial treatment recommendations, and subsequent follow up were extracted. The proportion of diagnostic agreement between the referring physician and the ARC consultant was calculated. Logistic regression was used to test for

odds of diagnostic agreement for hemorrhoids versus other common anorectal conditions. Logistic regression was used to compare odds of diagnostic agreement based on the specialty of the referring physician, and the age of the patient. A McNemar test was used to interrogate the odds of agreement for the different diagnoses and confirm the findings of logistic regression.

Results/Outcome(s): There were 627 consecutive patients assessed in the ARC during the study period, with an average age of 45.5 years (SD 14.2 years), and slightly more than half were male (54%). The most common provisional diagnosis from referring physicians was hemorrhoids (n=339), followed by anal fissure (n=50), rectal bleeding (n=48), and fistula in ano (n=38). Overall diagnostic agreement between referring physicians and ARC consultants was 58% (366/627). Agreement between ARC consultants and referring physicians was poor, with disagreement 63% of the time for the diagnosis of anal fissure, and disagreement 56% of the time for the diagnosis of fistula in ano. Disagreement between referring physicians and the ARC consultants was only 22% for the diagnosis of hemorrhoids. ARC consultants diagnosed 104 anal fissures (referral diagnoses n=50) and 60 fistulas (referral diagnoses n=38). The provisional diagnosis from a referring physician was statistically significantly more likely to be in agreement with the diagnosis of the ARC

P312 Operative outcomes

Types of operation, n (%)	
SPLS	8 (66.7)
SPLS + 2mm needle instrument	1 (8.3)
SPLS + 5mm port	3 (25)
Total operation time (min), median(range)	60 (32-100)
Type of appendicitis, n (%)	
Suppurative appendicitis	6 (50)
Gangrenous appendicitis	2 (16.7)
Perforated appendicitis	4 (33.3)
Location of appendix, n (%)	
Retrocecal	8 (66.7)
Pelvic	2 (16.7)
Retroperitoneal	1 (8.3)
Antececical	1 (8.3)
Adhesion, n (%)	
No	5 (41.7)
Mild	2 (16.7)
Moderate	1 (8.3)
Severe	4 (33.3)
Abscess, n (%)	
Periappendiceal fluid collection, n (%)	7 (58.3)
Blood loss (mL)	0 (0-10)
Diameter of resected appendix (mm), median (range)	8.5 (5-13)
Length of resected appendix (cm), median (range)	6.25 (4.2-8.5)
Drain placement, n (%)	5 (41.7)
Total length of incision (cm), median (range)	2 (1.2-2.5)

consultant for a diagnosis of hemorrhoids compared to that of anal fissure ($p < 0.0001$) or fistula in ano ($p < 0.0001$). McNemar test confirmed these findings regarding the high rate of disagreement for a diagnosis of anal fissure or fistula in ano ($p < 0.01$ for both). There was no statistically significant association between the specialty of the referring physician and the odds of diagnostic agreement with the ARC consultant's diagnosis, and no statistically significant effect of patient age on the odds of diagnostic agreement between the referral physician and the ARC consultant. Six patients (1%) referred to the ARC were found to have malignancy. Of these patients, two had been specifically referred to the ARC to rule out malignancy. The remaining 4 patients with malignant diagnoses were referred with a provisional diagnosis of hemorrhoids.

Conclusions/Discussion: Anorectal disease remains a diagnostic challenge for referring physicians, with significant divergence between the provisional diagnoses of referring physicians and consultant surgeons. This has important implications for patient treatment and outcomes. Anal fissure and fistula in ano are under recognized by referring physicians. While not life threatening, this delay prolongs the duration of patient symptoms prior to initiation of appropriate treatment. Sinister pathology is rare, but requires vigilance and a high index of suspicion. Ongoing education and collaboration between primary care physicians and surgeons is important to improve care for patients with these common anorectal conditions. Surgical evaluation of anorectal complaints remains vital to appropriate diagnosis and treatment.

A NEW MINIMALLY INVASIVE SPHINCTER-SAVING PROCEDURE TO TREAT HIGHLY COMPLEX ANAL FISTULAS: TRANSANA OPENING OF INTERSPHINCTERIC SPACE (TROPIS) PROCEDURE IN 238 HIGH COMPLEX ANAL FISTULAS.

P314

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Purpose/Background: In complex fistulas with significant intersphincteric component (high transsphincteric, horseshoe and supralelevator fistulas), the intersphincteric component acts like an abscess. Simply draining the intersphincteric sepsis once as is done in LIFT procedure would lead to recurrence in many cases (upto 50%). In such fistulas, laying open the intersphincteric part of the fistula through the transanal route (deroofting the abscess) ensures healing in most cases. This is the basis of TROPIS (transanal laying open of intersphincteric space) procedure. TROPIS was done and evaluated in high complex fistulas.

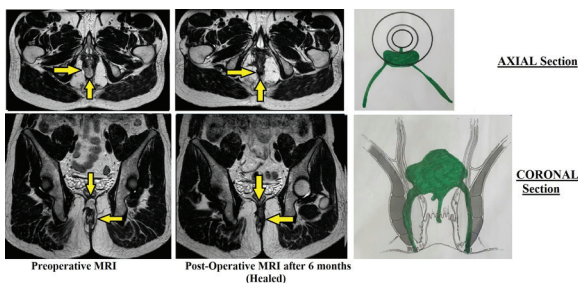
Methods/Interventions: All consecutive operated patients of complex high fistula-in-ano included. All fistula

were high (involving more than one-thirds of sphincter complex). Simple fistula in which fistulotomy was possible were excluded. Preoperative MRI scan was done in all the patients. The main outcome measures were healing rate, hospital stay, objective incontinence scores. Objective incontinence scoring (Vaizeys score) was calculated preoperatively and after 3 months of surgery. The six parameters assessed in the scoring were incontinence to gas, liquid and solid, alteration in lifestyle, need to wear a pad, need to take constipating medicines and ability to defer defecation for 15 min. The score of 0/24 indicated perfect continence and a score of 24/24 indicated complete incontinence. **OPERATIVE PROCEDURE:** A curved artery forceps was inserted through the internal (primary) opening into the intersphincteric part of the fistula tract. The mucosa and the internal sphincter over the artery forceps were laid open inside the rectum with electrocautery. The incision, starting from the internal opening, was usually curvilinear but could also be oblique, depending upon the direction of the intersphincteric tract. In case of horseshoe fistula, the incision extended on both sides of the midline posterior internal opening. In case of supralelevator extension/tract, the incision was extended from the midline posterior internal opening up to the supralelevator rectal opening. The external tracts are curetted and cleaned. In postoperative period, external tracts are cleaned from external opening. A tube (a part of urinary foley's catheter or suction catheter) was put in case of long external tracts. This helped in draining the external tracts as well as prevented the external opening from closing prematurely. The latter step was essential to prevent collection in the external tracts. The internal wound (wound inside the rectum created by TROPIS procedure) was gently cleaned once or twice a day with a gentle per-rectal examination. Once the internal wound is healed (about 4-6 weeks) as felt on per-rectal examination, the tube in external wound was removed.

Results/Outcome(s): 238 patients with high complex fistula-in-ano were operated over 4 years with a follow-up of 4-45 months (median-15 months). 29 patients were excluded due to short follow-up. Male/Female ratio was 189/20 and the age was 39.06 ± 9.3 years. 78% (163/209) were recurrent, 89% (186) had multiple tracts, 36.4% (76) had horseshoe tract, 27.8% (58) had supralelevator extension and 37.3% (78) had associated abscess. Fistula healed completely in 83.3% (174/209) and didn't heal in 16.7% (35/209). 27/35 of these were reoperated with the same procedure and fistula healed in 21 patients. Thus overall healing rate was 93.3% (195/209). 207/209 (99.0%) patients were discharged within 24 hours of hospital admission and 193/209 (92.3%) patients could resume their normal activities within five days of surgery. The pre-operative and post-operative Vaizey's incontinence scores in the fistulotomy group were 2.54 ± 1.7 and 3.42 ± 1.8 respectively ($p = 0.10$, insignificant, t-test). Thus there were no significant change in incontinence scores.

Conclusions/Discussion: The success rate of TROPIS (>93%) in high complex fistula (all were high and

majority were recurrent fistula with multiple tracts, horse-shoe tracts and supralevator extension) was quite impressive. The highlight of TROPIS procedure was that the intersphincteric tract/sepsis was laid open internally and allowed to heal by secondary intention as is done for abscess in closed space anywhere else in the body. Secondly, the complex fistula on both sides of the external sphincter was cleaned and tackled without cutting the external sphincter at all. Due to this reason, the risk to continence was minimized which was evident from no significant change in Vaizey's incontinence scores. Therefore, TROPIS procedure was simple, logical, minimally invasive, easy to reproduce, associated with short hospital admission and early resumption of normal activities. And highly effective for highly complex fistulas at the same time.



Recurrent high posterior fistula with abscess in a 32 year old male patient. Axial section (Upper row).

Posterior intersphincteric abscess with fistula seen hyperintense on T2 image (Upper left panel), healed tract seen on T2 (upper middle panel), Schematic diagram-axial section (upper right panel).

Coronal section (Lower row). High Fistula and abscess extending to supralevator region seen hyperintense on T2 image (lower left panel), healed tract seen hypointense on T2 (lower middle panel), Schematic diagram-coronal section (lower right panel).

LAYING OPEN AND CURETTAGE UNDER LOCAL ANESTHESIA (LOCULA) - A MINIMALLY INVASIVE PROCEDURE FOR PILONIDAL SINUS: PILONIDAL DISEASE MANAGEMENT NEEDS A PARADIGM SHIFT FROM MORE TO LESS.

P315

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Purpose/Background: Pilonidal sinus disease (PND) (including acute abscess) is very much similar to any subcutaneous abscess and should be treated like one. Logically also excision is unwarranted as PND is not a malignancy. Therefore, principles of standard treatment of a routine abscess anywhere in the body, simply laying open and curettage of sinus under local anesthesia (LOCULA), should suffice as adequate treatment for PND as well. We tested the efficacy of laying open and curettage of sinus under local anesthesia (LOCULA) procedure in all types of PND (simple and complicated).

Methods/Interventions: All patients with chronic PND, recurrent disease and acute abscess associated with PND were prospectively recruited between March 2011 and June 2018. Laying open with curettage of sinus cavity and its deroofting was done under local anesthesia on an outpatient basis. The wound was allowed to heal by secondary intention (Figure-1). The long term instructions were to remove hairs from the lower back and use talcum powder in the natal cleft to counteract sweating till the age of 30 years. The primary outcome measure was cure rate (recurrence). The secondary outcome measures were hospital stay, operating time, time taken to return to work, healing time and complication rate. Ethical Committee clearance was taken.

Results/Outcome(s): Eighty-one (81) consecutive patients were prospectively recruited over a 7.5 years and were followed for 3-89 months (median- 26 months). One patient was lost to follow up. Mean age -23.4 ± 4.7 years and M/F - 65/15. 24/80 (30%) presented as pilonidal abscess and 56/80 (70%) as chronic pilonidal disease. 21/80 (26%) had recurrent disease. The operating time was 21.0 ± 5.5 minutes and the hospital stay after the operation was 61.9 ± 21.5 minutes. All the patients were able to resume walking within two hours and resume their normal work in 3.8 ± 3.1 days. The healing time was 44.6 ± 8.3 days. 76/80 (95%) patients had complete resolution of the disease and four (5%) had a recurrence. All the recurrences happened in the patients who didn't adhere to the prescribed recommendations after the complete healing. Three patient with recurrence was operated again with the same procedure and got cured. The fourth patient was lost to follow up. Thus the overall cure rate was 98.75%. Two patient had a minor bleeding within the first week after the operation. Both the patients were managed conservatively in the outpatient clinic and the wound got healed subsequently.

Conclusions/Discussion: LOCULA (Laying open and curettage of sinus under local anesthesia) was highly effective in primary as well as complex pilonidal disease and had a cure rate of 95% after the first surgery and an overall cure rate of 98.75%. The complication rate was 2.5%. The procedure was also much less morbid (all cases were done under local anesthesia, operating time was short, all patients could resume walking within two hours, no admission was required and hospital stay was about one hour, resumption of normal work was possible by all patients within 4 days of surgery and the resultant wound was much smaller. LOCULA was equally effective in primary as well as complicated pilonidal disease (recurrent disease or acute abscess). LOCULA was easy to learn and teach, and, even in the case of a recurrence, it could be repeated as a day-care procedure. PND is not a malignancy. Therefore wide excision of the sinus is neither required nor can be justified. PND is like an any other abscess in the body with a slightly different/peculiar etiology. As shown by this study, PND managed like any other abscess (drainage and deroofting) suffices as adequate management. Excision of an abscess anywhere else in the body is not done as it unnecessarily increases the morbidity. For exactly same

reason, excision of sinus in PND is perhaps unwarranted. The long-term cure rates of LOCULA (95.5%–97%) are, in fact, better than all other available procedures. The advantage attributed to different flap procedures is that they flatten the contour of the buttock cleft and thus help to prevent long-term recurrence. However, as shown by the present study, removing hairs and using powder in the natal cleft to counteract sweating after LOCULA was equally effective to prevent recurrence without needing to alter the contour of the buttocks. Therefore, laying open (deroofing) and curettage under local anesthesia (LOCULA) as an outpatient procedure should be the first line procedure for all types of Pilonidal disease and abscess.

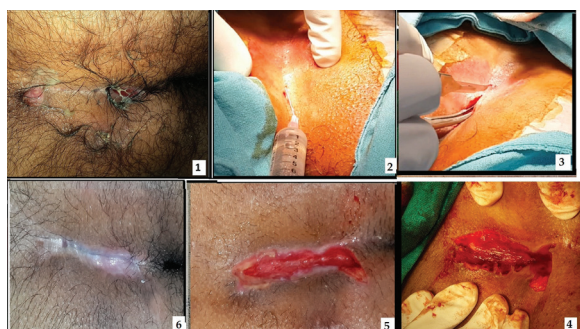


Figure-1: Lay open plus curettage procedure for Pilonidal disease
1-Preoperative photo without preparation. 2-Infiltration of local anesthesia. 3-Laying open after inserting an artery forceps in the sinus. 4- Immediate postoperative. 5-One week postoperative. 6-Completely healed wound - six weeks postoperative

COLORECTAL COMPLICATIONS ASSOCIATED WITH THE ESSURE® PERMANENT BIRTH CONTROL DEVICE: FIRST CASE REPORT AND REVIEW OF THE LITERATURE.

P316

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¹Glen Oaks, NY; ²Hungtinton, NY

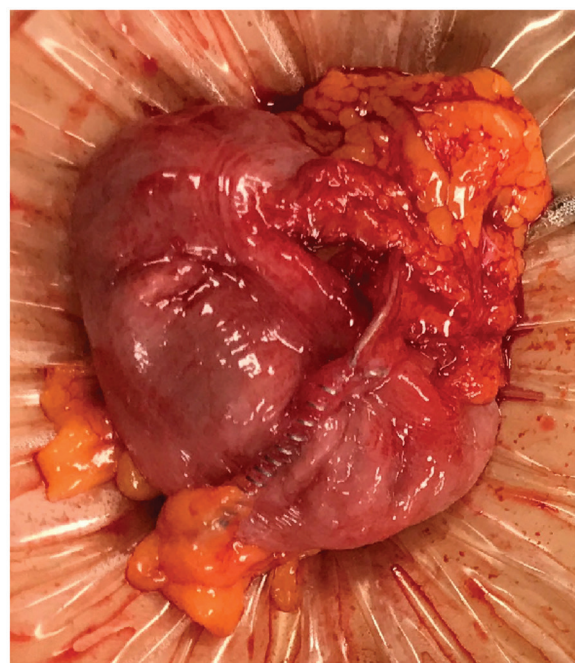
Purpose/Background: Purpose: To report the first known case of Essure® device migration into the colon. **Background:** Permanent sterilization is generally a safe and effective method of contraception. The Essure® hysteroscopic tubal occlusion device allows patients the option of permanent sterilization while avoiding incisions and offering placement in the outpatient setting. Essure® was approved in 2002 in the United States as a permanent birth control method and has been performed on more than 75,000 women worldwide. However significant complications have been reported, including device migration. We report the first known case of Essure® migration with implantation into the colon.

Methods/Interventions: We report a case of a 44-year-old woman who underwent placement of the Essure® permanent contraception device. The patient presented a year after with mild lower abdominal pain and subsequent imaging

studies demonstrated Essure® device migration and implantation into the sigmoid colon. She subsequently underwent a laparoscopic exploration and left partial colon resection with removal of the migrated device (Figure 1). She did well after surgery and had resolution of her symptoms.

Results/Outcome(s): Although intra-abdominal complications after placement of Essure® are rare, the device has been removed from the market in many countries. There have been thirteen reported cases of Essure® abdominal migrations in the literature, but this is the first to report a colon complication related to the device.

Conclusions/Discussion: In the majority of cases, the displacement of the device is asymptomatic and does not induce tissue damage, however we recommend a laparoscopic exploration and removal of the device for the vast majority of patients.



PERIOPERATIVE RISK FACTORS FOR CLOSTRIDIUM DIFFICILE INFECTION AFTER COLECTOMY.

P317

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Purpose/Background: National data shows that *Clostridium difficile* infection (CDI) incidence increased at an average annual rate of 3.3% from 2005 to 2014 in the United States alone. The risk of CDI recurrence increases as more recurrences occur, starting around 20% after first infection and increasing up to 60% after multiple infections. While the risk factors for CDI in general have been well documented, there have been few studies performed

to determine the risk factors for developing CDI after colectomy.

Methods/Interventions: We examined a total of 35,711 cases from the 2016 American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) targeted colectomy data. The patients were categorized by postoperative occurrence of *C. difficile* colitis, and the two cohorts were compared for operation, demographics, pre-operative factors, post-operative outcomes, operative information, operative factors, and complications.

Results/Outcome(s): A total of 35,711 cases were identified, 549 of which developed CDI postoperatively. The CDI cohort was significantly more likely to develop post-operative complications, undergo an unplanned intubation, and remain on the ventilator greater than 48 hours. Patients who underwent a partial colectomy with the removal of the terminal ileum were significantly more likely to develop CDI post-operatively. Additionally, patients who had oral antibiotic preparation and mechanical bowel preparation had a significantly lower rate of developing a CDI compared to patients who had neither.

Conclusions/Discussion: The clinical impact of the removal of the terminal ileum on the rate of CDI after colectomy is currently not well-established in literature. Therefore, we studied this clinical challenge, among others, in regards to postoperative CDI. We believe that removal of Peyer’s patches, lack of bile salt reabsorption, and a change in intraluminal pH that occur with the removal of the terminal ileum may contribute to higher rate of CDI.

TRENDS IN DIAGNOSIS AND MANAGEMENT OF CECAL DIVERTICULITIS.

P318

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Purpose/Background: Cecal diverticulitis (CD) is an uncommon condition most prevalent in the Eastern Asian populations that is most commonly diagnosed intraoperatively. Since right lower quadrant pain, guarding, and rebound tenderness are the typical presentation, CD is clinically indistinguishable from acute appendicitis and pre-operative imaging is often not performed. Although several case reports and series have been published, there still remains no definitive pre-operative means of diagnosis to plan appropriate conservative or operative treatment.

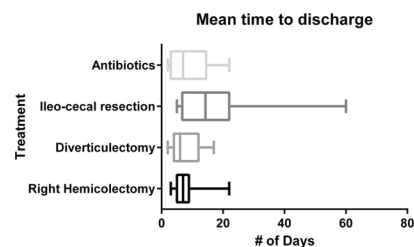
Methods/Interventions: Literature search was carried out using Pubmed, MEDLINE, and Scopus databases by two authors. The following Mesh terms were used: ‘cecal’, ‘cecum’, ‘diverticulitis’, and ‘diverticulum’ combined with the Boolean operator ‘AND’ (all synonyms were combined with the Boolean operator ‘OR’). Cecal diverticulitis was defined as the inflammation of cecal diverticulum as diagnosed either intraoperatively or post-operatively through

histology. Articles describing ascending colon diverticulitis and only appendicitis were excluded. The data were extracted from the papers to a previously defined table and included: demographics, clinical presentation, management modalities, and outcomes. Statistical analysis was performed using SPSS Software (Version 18; SPSS Inc., Chicago, IL, USA).

Results/Outcome(s): 72 articles reporting 156 cases were included in the study. Male to female ratio was 83:73 and mean age was 41.9±15.8. The most common clinical presentation of CD was right lower quadrant pain (139 patients, 89%), followed by nausea (46 patients, 29%), vomiting (35 patients, 22%), anorexia (14 patients, 9%), and constipation (6 patients, 4%). The most common physical exam findings were right lower quadrant tenderness (123 patients, 79%), followed by rebound tenderness (30 patients, 19%) and guarding (28 patients, 18%). A palpable mass was appreciated in 19 patients (12%). Means of diagnosis was operative in 140 patients (90%). Initial diagnosis was acute appendicitis in 118 patients (76%) compared to CD in only 8 patients (5%). All patients with preoperative CT scan (8 patients, 5%) were correctly diagnosed with CD, and 6 patients (75%) were treated conservatively without any complications. The most common means of treatment was right hemicolectomy (60 patients, 38%), followed by diverticulectomy (44 patients, 28%), ileocecal resection (27 patients, 17%), and antibiotics (6 patients, 4%) with post-operative complications in 12%, 9%, 7%, and 0% and mean time to discharge 7.7,7.6,16.3, and 8.4 days respectively (p=0.86, 0.0003) (Figure 1). Mortality rate was 1.3%.

Conclusions/Discussion: CD is a rare condition that is often misdiagnosed pre-operatively. In cases of suspected appendicitis, CD should be ruled out as correct pre-operative diagnosis can be treated conservatively. CT scan is a useful tool to diagnose CD preoperatively and avoid unnecessary laparotomy.

Tukey's multiple comparisons test	Mean Diff.	95% CI of diff.	Significant?
Right Hemicolectomy vs. Diverticulectomy	0.2095	-4.756 to 5.175	No
Right Hemicolectomy vs. Ileo-cecal resection	-8.537	-13.69 to -3.381	Yes
Right Hemicolectomy vs. Antibiotics	-0.6255	-9.375 to 8.124	No
Diverticulectomy vs. Ileo-cecal resection	-8.746	-14.79 to -2.703	Yes
Diverticulectomy vs. Antibiotics	-0.8350	-10.14 to 8.465	No
Ileo-cecal resection vs. Antibiotics	7.911	-1.492 to 17.31	No



Mean Time to discharge Figure 1. Mean time to discharge and ANOVA Results

LIGATION OF INTERSPHINCTERIC FISTULA TRACT WITH BIOPROSTHETIC MESH OFFERS A PROMISING RELIEF FOR PATIENTS SUFFERING FROM ANAL FISTULA: A REVIEW OF LIFT OUTCOMES DATA.

P319

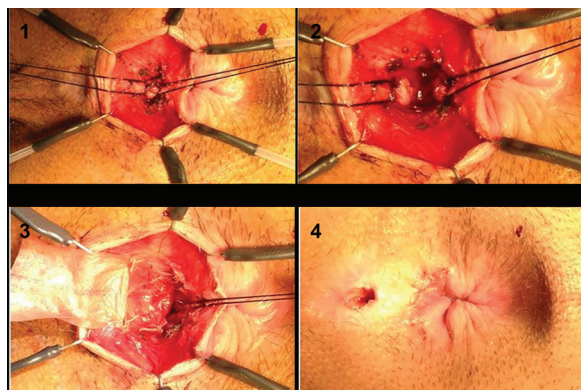
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Purpose/Background: Fistula in ano present a real challenge for definitive management and repair. Ligation of intersphincteric fistula tract (LIFT) has been shown to offer a better option for patients who are not candidates for fistulotomy. It is a relatively simple procedure that has demonstrated good success among sphincter-sparing techniques. The addition of bioprosthesis mesh to the repair is an innovative method to help improve outcomes. This is a retrospective review that aims to evaluate the effectiveness of the LIFT procedure with the addition of biologic mesh at University of Tennessee Medical Center, and identify any factors contributing to failure or success.

Methods/Interventions: The records of patients who underwent this technique, evaluating age, gender and presence of incontinence were studied. The technical first-step included the correct identification of a trans sphincteric fistula in ano followed by the placement a non cutting seton. The second stage involved the LIFT technique with interposition of porcine submucosa mesh. We evaluated primary heal rate with one two-stage intervention and successive interventions. Secondary endpoint was evaluation of fecal incontinence. Patients with Crohn's disease and multiple branching anal fistulas were excluded.

Results/Outcome(s): The patients were 14 men and 16 women. The mean age was 48 years. Of these, 77% had complete healing of the fistula, 23 were cured only with the two stage procedure, and 7 required additional operation with simple fistulotomy. No patients developed fecal incontinence. There were no deaths in this series.

Conclusions/Discussion: The intersphincteric ligation technique of the fistulous tract with biologic mesh interposition proved to be effective for the treatment of anal fistulas.



COMPARISON OF SHORT-TERM OUTCOMES OF 3D LAPAROSCOPIC EXTRALEVATOR ABDOMINOPERINEAL EXCISION VERSUS CONVENTIONAL ABDOMINOPERINEAL RESECTION IN LOW RECTAL CANCER.

P320

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Purpose/Background: To compare the short-term outcomes between laparoscopic extralevator abdominoperineal excision and conventional abdominoperineal excision in low rectal cancer.

Methods/Interventions: Sixty-two patients were selected to accept abdominoperineal excision for low rectal cancer at the department of Anorectal Surgery in Shanghai East Hospital from December 2015 to June 2016. Patients were randomized to L-ELAPE group (n=12) and APE group (n=52). The perioperative outcomes and pathological evaluation of surgical specimen of two groups were retrospectively collected and compared.

Results/Outcome(s): The differences of baseline data (gender, age, BMI, distance from tumor to anal verge measured by colonoscopy and clinical tumor category) between two groups were not significant (all $P > 0.05$). Compared to APE group, L-ELAPE group have shorter operation time [(185.6 ± 7.3) minutes vs. (162.2 ± 21.5) minutes, $t = -2.5$, $P < 0.001$], and less blood loss [(41.2 ± 5.2) ml vs. (30.3 ± 15.6) ml, $t = -1.168$, $P = 0.007$]. Lower perineal wound complication rate (10.5% vs. 22.0%, $t = -2.142$, $P = 0.021$) were observed in the ELAPE group as compared to the traditional APE group. Within post-operative 30-day follow-up, L-ELAPE group had ileus in one patient and anastomotic leakage in three patient, and traditional APE have anastomotic leakages in five patients. The number of harvested lymph node showed more in L-ELAPE group (12.6 ± 3.5 vs. 15.7 ± 4.2, $t = -1.789$, $P = 0.0246$). The L-ELAPE group had lower rate of intraoperative perforation (4.1% vs. 20.9%, $t = -3.214$, $P = 0.032$). During follow-up of 6 months, no tumor local relapse and distant metastasis were found in the both groups.

Conclusions/Discussion: As compared to conventional abdominoperineal excision, laparoscopic extralevator abdominoperineal excision has better oncologic clearance. Meanwhile L-ELAPE have better short-term efficacy.

STANDARDIZING ROBOTIC-ASSISTED COLORECTAL TRAINING: ASSESSMENT OF THE RESIDENT EXPERIENCE.

P321

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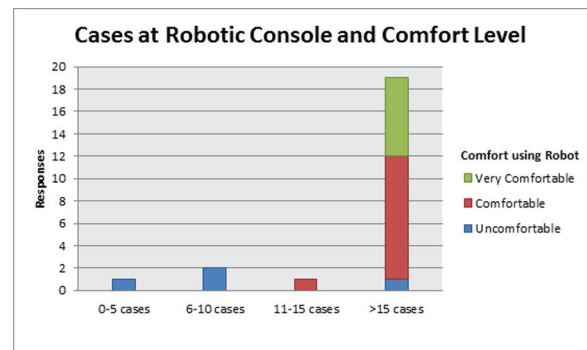
Purpose/Background: Robotic-assisted laparoscopic surgery has undergone rapid growth and adoption in general and colorectal surgery. It remains unclear how this increasing utilization of robotic surgery affects surgical training. While many residencies have introduced formal robotics training curricula, there remains no consensus as to the best format and route for this training. Since our institution's initial adoption of the robotic platform for colorectal surgery in 2012, robotic-assisted cases represent an increasing proportion of residents' operative exposure and total case logs. We set out to characterize the effectiveness of our training paradigm in preparing recent graduates for the incorporation of robotic surgery in practice.

Methods/Interventions: Residents are directed to work towards obtaining the da Vinci residency training equivalency certificate (Intuitive Surgical) by completing an online course, assessment, and attending an in-service training. After completion of this prerequisite work, the trainee is permitted to participate in robotic cases – first, as a bedside assistant, and later as the operating console surgeon on a dual-tandem console. To investigate the impact of this curriculum on graduates' attitudes and practice, an electronic 20-question survey was distributed to graduates who completed their residency training during the years 2012 – 2018. This instrument assessed experience using the robot during residency, current practice habits, and allowed for free-text feedback.

Results/Outcome(s): Of thirty-three former residents who received the survey, twenty-six responses were obtained (79%). Thirteen (50%) of the responders are credentialed to perform robotic surgery, while an additional three (12%) utilize the robot in their fellowship currently, but have not undergone credentialing for independent practice. Nineteen (73%) reported that they felt comfortable or very comfortable on the robotic platform at the end of their residency which correlated directly with an increased number of cases performed at the console during training. Performing >15 cases at the robotic console was associated with feeling very comfortable (27%) or comfortable (46%) using the robot after residency. Those specializing in breast, vascular, and trauma critical care comprised 27% of responses and tended to participate in fewer robotic cases during residency, but still self reported at least feeling comfortable using the robot if >15 cases were completed at the console.

Conclusions/Discussion: The rapid adoption of robotic surgery poses unique challenges for surgical training. Just under half of residents surveyed in one series report that robotic surgery negatively impacts resident training.

Resident experience with the robotic platform is typically in the capacity of an observer or bedside assistant, with only a minority of trainees reporting experience operating the robotic console. In the absence of a nationally standardized curriculum, individual residencies are left to determine how best to align didactic teaching, simulation, and experiential learning in preparing trainees for robotic surgery. We find that the number of cases performed at the robotic console during training is the key determinant of graduates' comfort with, and adoption of the robotic platform in practice. Our data suggest that refinements in robotics training curricula are best directed at optimizing the educational yield of limited operating console time. The next step is to further standardize robotic training for specific procedures to optimize trainee time at the console. We have developed a standardized approach for teaching robotic-assisted laparoscopic sigmoidectomy and look forward to discovering how this will influence training in the evolving field of surgery.



A CASE OF RETROPERITONEAL NECROTIZING FASCIITIS: A RARE AND DEADLY SPREAD.

P322

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Purpose/Background: Necrotizing fasciitis (NF) is a potentially lethal spread of infection that is seen commonly in the extremities and the perineal regions, rarely reported to involve the retroperitoneal space. Irrespective of the etiology and the causative organism, NF remains a serious surgical emergency with high morbidity and mortality not only associated with the disease process itself, but also with the surgical management it requires. We present a rare case of NF in the retroperitoneal space secondary to a perineal infection and its successful management with timely surgical intervention.

Methods/Interventions: A 69 year old female patient presented to accident and emergency department of a district general hospital in England with a history of feeling unwell associated with intermittent fever with rigors and chills and worsening perineal swelling and pain over 5 days. On examination, she appeared unwell, clammy,

was spiking a fever and was tachycardiac and hypotensive. There was extensive erythematous skin changes to the entire perineum, which was tense and tender. Abdominal examination was completely unremarkable. CT scan showed extensive perineal surgical emphysema extending along the vagina/anorectum and presacally into the retroperitoneum and central mesentery. There was gas around the recto-sigmoid but the centre of gravity of associated soft tissue changes was seen around the perineum. The patient underwent extensive emergency debridement of the entire perineum around anorectum extending to the retroperitoneal space. The perineal tissue was found to be devitalized and significant amount of gas under pressure was released. Tissues were sent for histology and microbiology analysis. Dressings were applied and patient managed in ICU. She underwent relook surgery with further debridement, feeding jejunostomy and diversion colostomy formation. Microbiology showed heavy growths of *Corynebacterium* and mixed anaerobic species; the patient was kept on appropriate antibiotics. A negative pressure dressing was applied on the 4th admission day.

Results/Outcome(s): She was taken to theatre every third day for relook and further debridement as required with negative pressure dressings, until healthy granulation tissue was seen in the wound on the 19th day after admission when drains were removed and the wound loosely closed. Her mobility and nutrition was optimized and her perineal wound went on to heal very well. She was finally discharged on the 42nd day, has been reviewed in the outpatient clinic and is currently being planned for reversal of defunctioning colostomy.

Conclusions/Discussion: The term necrotizing fasciitis (NF) comprises a group of potentially lethal infections confined to fascial planes involving the skin, subcutaneous tissue and/or muscles. The distinguishing feature of this infectious process is its rapid spread with the planes leading to degeneration and eventual necrosis of the tissues. Mortality associated with NF ranges between 24-76%, being higher in abdominal and perineal infections. For this infectious process to extend into the retroperitoneum is a very rare entity. The rare extension into the retroperitoneal plane is mostly reported secondary to a traumatic cause such as perforated appendicitis or diverticulitis, pancreatitis, pyelonephritis, gastroduodenal perforation, necrotic cholecystitis, perforated bowel tumor and various perineal infections and abscesses. The polymicrobial type is more commonly seen in intraperitoneal and retroperitoneal sources of infection; the most commonly encountered organisms are usually *Streptococcus* species. Involvement of the retroperitoneal space can present variably with non-specific symptoms ranging from presence or absence of abdominal or flank pain, fever, subtle local skin changes with variable presentations of Cullen's or Gray Turner's sign with overt signs of crepitus and necrosis appearing late. Due to this varied presentation, a high index of suspicion should be maintained to diagnose

retroperitoneal necrotizing fasciitis (RNF). CT scanning is the primary modality for diagnosing RNF with sensitivity reaching 100% which can effectively determine the extent of the involvement of retroperitoneal space. Irrespective of the cause, once suspected or confirmed, the treatment of NF or RNF involves radical, extensive and repeated surgical debridement, addressing the underlying cause, negative pressure dressings and broad spectrum and later on targeted anti-microbial therapy. Although RNF possess a challenging clinical scenario, extensive and targeted surgical intervention can better the outcome for patients presenting with such infections. As seen in our case, timely investigation, diagnosis and management followed by meticulous subsequent operative and postoperative management plans led to the successful recovery of a patient brought in with a lethal rapidly spreading infection.

MULTI-SPECIALTY RECTAL CANCER TEACHING SYMPOSIUM FOR POST-GRADUATE TRAINEES: NEEDS ASSESSMENT AND PILOT SESSION.

P323

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Purpose/Background: Rectal cancer care is complex and requires a multi-disciplinary approach to optimize treatment and outcomes. Physician specialists interact regularly through multi-disciplinary treatment (MDT) conferences to sequence treatment and review outcomes, but post-graduate trainees frequently receive only specialty specific siloed teaching. There were 2 objectives when embarking upon the organization of this symposium: to assess the educational needs of post-graduate trainees who partake in rectal cancer management and assess the feasibility of a multi-specialty teaching symposium.

Methods/Interventions: A needs assessment survey was distributed to residents and fellows in programs receiving education on rectal cancer. A multi-specialty teaching symposium for trainees in these programs was designed to address trainee perceived knowledge deficiencies and present all aspects of rectal cancer management (such as staging, surgical approaches, indications for neoadjuvant treatment, interpretation of pathology, etc.) taught by local experts, as well as mock MDT cases. Evaluations were used to assess the impact and effectiveness of this teaching approach. About 50 residents attended the session and evaluations were completed by over 50% of attendees electronically.

Results/Outcome(s): Trainees from all disciplines responded to the pre-session electronic needs assessment, with 71% being postgraduate year 3 or higher. The majority (57.9%) felt they received adequate teaching on rectal cancer; however, many rated their knowledge as only adequate (39.5%) or poor/very poor (34.2%). Of the

12 subject areas surveyed, respondents felt they were least knowledgeable about radiation protocols, chemotherapy protocols, endoscopic techniques for tissues diagnosis, interpretation of staging imaging, and surgical complications. Trainees were very satisfied with the symposium, with the overall content rated at 4.69/5 (mean) and overall relevance to training 4.65/5 (mean). Every respondent stated they wished to have similar educational sessions like this in the future.

Conclusions/Discussion: Overall, it is clear that trainees in many specialties perceive deficits in their knowledge of rectal cancer management. A multi-specialty approach to rectal cancer teaching was feasible to fulfill the educational needs of post-graduate trainees from 6 specialties (General Surgery, Gastroenterology, Radiation Oncology, Medical Oncology, Diagnostic Radiology, and Pathology) in a symposium setting, and was very highly valued by the trainees.

STOMAS IN CYTOREDUCTIVE SURGERY AND HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY FOR COLORECTAL AND APPENDICEAL NEOPLASMS: RISK FACTORS AND OUTCOMES.

P324

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Purpose/Background: Cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) have evolved as promising treatment for patients with peritoneal carcinomatosis (PC) of colorectal origin. However, CRS/HIPEC is associated with a high rate of morbidity and mortality. When a concomitant resection is performed, a stoma might be employed in an attempt to mitigate against anastomotic leak or at least its major adverse sequelae. The primary aim of this study was to evaluate the factors evaluating the decision-making and outcomes of performing a stoma during CRS/HIPEC.

Methods/Interventions: An IRB approved database was used to identify patients with appendiceal and colorectal neoplasms whose diagnosis of PC was suspect or confirmed between November 2009 and February 2018. We divided the sample between two groups of patients: with stoma and without stoma. Comparison was made for demographics, surgical parameters, and postoperative outcomes. Categorical and ordinal variables were presented by valid percentage and analyzed using the Chi-square test. Continuous variables were presented using mean and standard deviation (SD) and analyzed using the independent sample t test. A multivariate logistic regression analysis was performed on all pre- and intraoperative factors, which were statistically significant after univariate analysis.

Stoma reversal analysis was calculated using the Fischer's exact test. Survival probabilities were calculated using the Kaplan-Meier method. A *p* value <0.05 was considered statistically significant.

Results/Outcome(s): 110 consecutive patients underwent CRS/HIPEC for appendiceal or colorectal neoplasm. Stoma was performed in 32 patients (29.1%): 15 (13.6%) loop ileostomies and 11 (10.0%) end ileostomies. In 18/110 (16.4%) the ileostomy was diverting a colorectal or small bowel anastomosis. Preoperative factors associated with stoma formation included rectal tumor (21.9% vs. 7.7%; *p*=0.031), BMI <30 (81.3% vs. 58.4%; *p*=0.023), chemotherapy, hypoalbuminemia and PCI ≥ 10 (59.4% vs. 29.5%; *p*=0.002). A greater cytoreduction surgery (87.5% vs. 32%; *p*<0.001), residual disease (50% vs. 20.5%; *p*=0.002), estimated blood loss (662.5 ± 687.4 vs. 250.0 ± 305.6; *p*<0.001), RBC transfusion (43.7% vs. 11.5%; *p*<0.001), and multiple small bowel and multivisceral resections were intraoperative factors that significantly led to a higher incidence of stoma formation. The incidence of complications was 56.2% in patients with stoma vs. 52.6% in those without stoma (*p*=0.7). Patients with stomas had significantly more wound infection, severity of morbidity, longer hospitalization (10.5 ± 4.6 vs. 7.1 ± 3.7; *p*=0.028), reoperation and mortality rates (50% vs. 20.5%; *p*<0.002). Of 31 patients, 8 (25%) underwent stoma reversal, 1 by laparotomy. Mean time to stoma closure was 5.3 (±2.8) months with a morbidity rate of 4.5%.

Conclusions/Discussion: Patients with appendiceal or colorectal neoplasms with a higher carcinomatosis burden requiring major cytoreductive surgery and RBC transfusion are more likely to have a stoma constructed. Only one quarter of these patients may undergo stoma reversal, highlighting the importance of preoperative counseling.

VALUE OF THE MULTIDISCIPLINARY TEAM (MDT) FOR PATIENTS WITH RECTAL CANCER.

P325

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Purpose/Background: Cancer care has been improved by the Multidisciplinary-team (MDT) approach. This study aimed to review the early outcomes of MDT for the treatment of T3 rectal cancer at our institution.

Methods/Interventions: Between January 2015 and June 2018, 170 MDT sessions were held. Based on patient medical records and the MDT meeting minutes, all sessions were retrospectively evaluated for functioning data based on the American College of Surgeons Commission on Cancer (ACS CoC) National Accreditation Program for Rectal Cancer (NAPRC) standards manual. All cases were presented at the first encounter at our institution

to formulate a cancer treatment plan. The analysis was done to compare the two groups: newly diagnosed T3 rectal cancer whose treatment plan was decided at a MDT meeting from January 2015 through June 2018 (cases), and newly diagnosed T3 rectal cancer patients diagnosed from January 2012 through December 2014 (control).

Results/Outcome(s): 338 patients of a mean age of 60.4 (range, 22 to 95) years had rectal cancer, including 218 (64%) males; 265 (78%) were newly diagnosed cancers, 36(13.6%) in the upper, 92 (34.7%) in the middle, and 137 (51.7%) in the lower rectum. 2(0.7%) stage 0 rectal cancer, 63(23.8%) were stage I, 65(24.6%) stage II, 9(3.4%) were stage IIIa, 83(31.3%) were stage IIIb, 5(1.9%) were stage IIIc, 29(10.9%) were stage IV, 9(3.4%) could not be clinically staged. The average length of MDT meetings was 55.6 (12-90) minutes during which a mean of 5.76 (range 1 to 12) patients were discussed. Improvements in NAPRC requirements have occurred throughout the study period in our MDT. Through univariate analysis there was no significant decrease in the incidence of abdominoperineal resection versus low anterior resection [odds Ratio (OR) 1.382 (0.671-2.845, 95%CI)], the excision of a complete mesorectal specimen [OR 0.961 (0.544-1.700, 95%CI)], the number of positive lymph nodes evaluated ($p=0.749$), or the distal margins ($p=0.880$). However, the number of assessed nodes increased from a mean of 20.6 in control to 24.6 nodes in cases($p=0.026$). Although on univariate analysis, patients underwent less neoadjuvant therapy [OR 1.943 (1.112-3.396, 95%CI)], in multivariate analysis, these data showed no statistical significance.

Conclusions/Discussion: Improvements in quality of care including the number of nodes were noted highlighting the value of the MDT and the importance of the NAPRC.

COLORECTAL ANASTOMOTIC BREAKDOWN 3 MONTHS AFTER LOW ANTERIOR RESECTION FOR AN UPPER RECTAL CANCER.

P326

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Purpose/Background: Anastomotic breakdown is one of the dreaded complications of colorectal surgery. It increases the morbidity, mortality, cost, and length of stay. We present a unique case of a patient who developed an anastomotic dehiscence 2 months after his initial oncologic resection.

Methods/Interventions: A 63-year-old obese male presents after undergoing colonoscopy for change in bowel habit and hematochezia and was found to have an upper rectal cancer. He underwent robotic assisted low anterior resection. One month later, he returned with a contained leak, which was managed non-operatively with a short 6-day hospital course. He went on to receive adjuvant

chemotherapy with Folfox. He presented 2 months later with an anastomotic breakdown and underwent a transverse colostomy. He was unable to have a revision of his anastomosis due to a frozen pelvis, likely secondary to his previous leak. He had a prolonged hospital course including a lengthy stay in the ICU and was discharged to LTAC. Future attempts at colostomy closure were unsuccessful.

Results/Outcome(s): Ultimately, the patient was unable to have his colostomy closed due to a frozen pelvis. However, on follow up, the patient is progressing well with no complications and has been cancer free since the surgery. Of note, the patient was on chemotherapy and did not receive radiation prior to or after the time of his anastomotic leak. His pathology revealed high grade adenocarcinoma arising in mucosa, penetrating muscularis propria with margins free of tumor with final stage T2,N1BMO with no lymphovascular invasion and no perineural invasion. The patient is over 5 years out from surgery and disease free at this point.

Conclusions/Discussion: The incidence of anastomotic leak has been reported in the literature ranging from 1-13%.^{3, 5, 7-9} Patients may present with nonspecific symptoms, or with septic shock, peritonitis and sudden deterioration.^{1,2,3, 5} Risk factors for leak are numerous, but the only one pertaining to our patient was perioperative NSAID usage. The fact that the patient was on chemotherapy may have also contributed to the patient's anastomotic leak. This case brings up a clinical dilemma of whether or not to divert patients who have been found to have an anastomotic leak post-operatively, but do not require emergent fecal diversion. Diverting patients will not prevent leaks, however it will decrease the sequela of the leak such as a frozen pelvis, as this patient had. Another pearl to learn from this case, is the timeframe in which leaks occur. A review of the literature shows that most leaks are discovered within the first few weeks after surgery, with the longest reported being a little over 1 month after surgery^{3,4}. We present a case of an initial leak at 1 month followed by a dehiscence after 3 months. To our knowledge, this is the first time that this has been reported in the literature. Given our experience with this patient, early fecal diversion may be a better strategy in a patient with anastomotic leak who will undergo chemotherapy in the near future.

ACCURACY OF MRI RESTAGING COMPARED WITH HISTOPATHOLOGICAL OF THE LOCALLY ADVANCED RECTAL CANCER PATIENTS AFTER NEOADJUVANT CHEMORADIOTHERAPY.

P327

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Purpose/Background: to evaluate the diagnostic accuracy of rectal MRI restaging.

Methods/Interventions: One-hundred thirty three patients, with locally advanced rectal cancer, who were undergoing preoperative CRT, were recruited for the study. High resolution, rectal MR image, adding diffusion-weighted image (DWI) was performed on all patients, after neo-adjuvant CRT, with the day not exceed 12 weeks, after complete neo-adjuvant CRT. The accuracy of T, N restaging and anal sphincter evaluation were performed by comparing the histopathology.

Results/Outcome(s): The diagnostic accuracy of T restaging was 51% ($K=0.3$), increasing to 68% ($K=0.31$), when T restaging was grouped for T0-2 and T3-4. The PPV of T0-2 and T3-4 were; 60% and 70 %, respectively. The T4b accuracy, and PPV were; 93% ($K =0.71$) and 66%, respectively, which provided the best accuracy in subgroup analysis. On the other hand, the diagnostic accuracy of N restaging was 67% ($K =0.22$), increasing to 72% ($K =0.29$), when N restaging was grouped for N0 and N1-2. The N0 accuracy and PPV were 72% ($K =0.29$) and 76%, respectively, which were the best PPV in subgroup analysis. There were 39 patients, who underwent abdominoperineal resection. The diagnostic accuracy of sphincter evaluation was 78% ($K =0.32$). The PPV and NPV of sphincter evaluation were 25% and 100%, respectively.

Conclusions/Discussion: MRI restaging, after preoperative CRT of locally, advanced rectal cancer patients had a fair to moderate accuracy. It will be more accurate if the stage is T3-4 and N0, especially in T4b restaging. The anal sphincter involvement evaluation must be judiciously interpreted if, an MRI found anal sphincter involvement. On the other hand, there was absolutely confidence if the result was negative.

ENDOSCOPIC SUBMUCOSAL DISSECTION (ESD) VERSUS TRANSANAL ENDOSCOPIC MICROSURGERY (TEM) FOR THE TREATMENT OF EARLY RECTAL CANCER: COMPARISON OF LONG TERM OUTCOMES.

P328

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Purpose/Background: Methods for the local treatment of early rectal cancer have been developed and improved in the recent years. In this scenario, the transanal endoscopic microsurgery (TEM) and the endoscopic submucosal dissection (ESD) have played an important role. Both have its own advantages and drawbacks, but there are still few studies comparing them. Previous studies have shown that both techniques have similar short term outcomes. Studies comparing the long-term outcomes of both techniques are scarce. The aim of this study was to o compare long term outcomes between ESD and TEM for the treatment of early rectal cancer.

Methods/Interventions: It was a retrospective study with a prospective cohort of patients submitted to 103 procedures, either ESD or TEM, from 2008 to 2017 in a single institution, specialized in cancer treatment. Patients who were first evaluated by oncologists were referred to the Endoscopy Department, where the lesions were assessed by magnification chromoendoscopy and, if no sign of deep submucosal invasion was observed, ESD resection of the lesion was performed. Otherwise, they were referred to surgical resection. Patients who were first evaluated by colorectal surgeons had their lesions assessed by 3D endorectal ultrasound and were referred to TEM if the lesion was considered T1. Data regarding age, surgical risk, early and late complication rates, recurrence and anatomopathological report were collected retrospectively from medical records. Qualitative variables were submitted to a chi-square analysis and the quantitative ones, to a t-Student test.

Results/Outcome(s): The mean follow-up of these patients was 34 months, 74 of them (71,8%) were submitted to ESD and 29 to TEM (28,2%). The average age in the ESD group was 65,5 years and 51,3% of those patients were female. Among the patients submitted to TEM, the mean age was 66,51 years and 58,6% of them were female. The surgical risk was equivalent in both groups ($p=0,97\%$). The lesions removed by ESD were significantly larger than the ones removed by TEM - 68,9mm against 44,79mm, respectively ($p=0,002$). The mean procedure duration was 176 min for the ESD and 195 min for the TEM ($p=0,4$). In the ESD group, 7 patients (9,46%) had early complications, 2 of which were Clavien I, 3 Clavien II and 2 Clavien III. In the TEM group, 5 patients had complications (17,2%), of which 2 were Clavien I, 1 Clavien II, 1 Clavien III and 1 Clavien IV ($p=0,19$). The average days of hospitalization was 3,4 among the ESD patients and 6,9 among the TEM ($p=0,015$). During the first post-operative month,

10 patients (13,5%) from the ESD group presented mucor-rhea, fecal urgency and/or incontinence and anal stricture requiring dilatation. By the end of 18 months, all patients were asymptomatic. Among the patients undergoing TEM, 7 (24,13%) had rectal pain, diarrhea or fecal incontinence. After 18 months, 6 were asymptomatic and one persisted with rectal pain. The lesions removed either by ESD or TEM had similar rates of en-bloc resection - 89,2% and 96,5%, respectively ($p=0,23$) and R0 resection - 85,13% and 82,6%, respectively ($p=0,742$). The anatomopathological analysis of the lesions removed by ESD showed 27% of adenomas, 64,86% of intramucosal adenocarcinoma, 4% sm1 adenocarcinoma and 4,05% of sm \geq 2 adenocarcinoma (non-curative resection). In the TEM group, 31% were adenomas, 44,8% of intramucosal adenocarcinoma, 7% of sm1 adenocarcinoma and 17,2% of sm \geq 2 adenocarcinoma. Therefore, the ESD had a higher percentage of curative resections ($p=0,002$). Among the patients undergoing TEM, there was a 24,13% recurrence rate, against 1,3% in the ESD group ($p=0,0001$).

Conclusions/Discussion: The ESD, compared with the TEM, showed better results, enabling the treatment of significantly larger lesions, with a higher curative rate, less hospitalization days and lower recurrence rates.

NON SPECIFIC, ACUTE POUCHITIS IN PATIENTS WITH FAMILIAL ADENOMATOUS POLYPOSIS: LESS COMMON THAN WE THINK.

P329

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Purpose/Background: While chronic pouch inflammation is a natural consequence of stool storage in the small intestine, non-specific, acute pouchitis is reported to be the most common complication of ileal pouch-anal anastomosis (IPAA) in patients with Ulcerative Colitis. Some studies suggest that it also happens in patients with

Familial Adenomatous Polyposis (FAP), despite completely different underlying pathophysiology. The controversy in this suggestion lies in how non-specific acute pouchitis (NSAP) is defined. The aim of this study was to see how often true NSAP occurs in patients with FAP

Methods/Interventions: All patients with FAP who had IPAA from 1983 to 2018 were accessed through an IRB-approved pouch database. Patients labeled with the diagnosis of 'Pouchitis' were identified and their records were closely examined for symptoms, biopsy results, and photographs of the pouch taken during pouchoscopy. We defined NSAP as follows: endoscopic findings of erythematous, granular, edematous and fragile mucosa with loss of vascular pattern, contact bleeding with or without inflammatory ulcers, plus histology confirming acute enteritis, plus appropriate symptoms such as rectal bleeding, stool frequency and general malaise.

Results/Outcome(s): 38 patients were identified out of 250 that were screened. There were 23 males and 15 females. Average age was 55 years (range 18 to 90 years). None of the patients had acute pouchitis diagnosed by a surgeon as none of the patients fulfilled our criteria for acute pouchitis. In 9 cases the diagnosis of pouchitis seemed to be derived from pouch ulcers. These were not inflammatory ulcers but were benign ulcers common in ileal pouches. Stool frequency was the most frequent reason for a "pouchitis" diagnosis but there were always other causes for the frequency as shown in the table. A full list of symptoms is shown in the table. Average stool frequency was 9, ranging up to 15 per day. Every patient had at least one pouch endoscopy: the average number was 19 per patient. Anorectal physiology testing and pouchoscopy were used in patients with difficult evacuation but a normal IPAA. 9 patients had pouch biopsies done due to rule out inflammation: all showed chronic active enteritis, a normal finding in ileal pouches.

Conclusions/Discussion: Non Specific, acute pouchitis almost never happens in patients with FAP. Stool

P329 Presenting Symptoms and Etiology

Presenting symptoms	Frequency N= 38	Likely cause
Frequency/ Urgency	26	Anal stenosis, (6) Afferent limb syndrome, (3) Paradoxical puborectalis (4) C difficile pouchitis, (1) Poor diet/stool consistency (12)
Anal Pain	4	Fissure, (1) anal excoriation (2) Hemorrhoids (1)
Incomplete emptying	3	Anal stenosis (1) S pouch efferent limb (1) Pouch twist (1)
Nocturnal incontinence	3	Anal Stenosis (3)
Diet intolerance	2	Small bowel obstruction (2)

frequency is usually due to structural or functional issues with the pouch, and the presence of ulcers in the pouch does not necessarily mean “pouchitis”. Those caring for FAP patients with a pouch should seek other causes for pouch-related symptoms than “pouchitis”.

PELVIC EXENTERATION FOR NON-COLORECTAL MALIGNANCY REQUIRING PROCTECTOMY: SURGICAL AND ONCOLOGIC OUTCOMES.

P330

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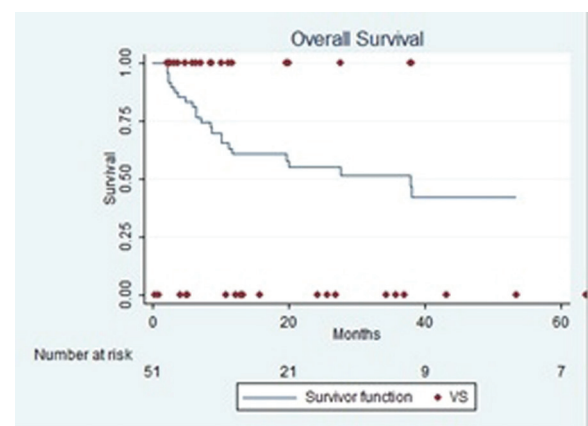
Purpose/Background: Pelvic exenteration is performed for patients with locally advanced and recurrent malignancies of the pelvis. There is a paucity of data describing outcomes of patients undergoing pelvic exenteration requiring proctectomy for non-colorectal malignancy. A collaborative multidisciplinary surgical team of colorectal, gynecologic, urologic, plastic, and orthopedic surgeons is often needed to perform a complete resection of these tumors and provide the patient with optimal long-term outcomes. The aim of this study was to describe long and short term outcomes after pelvic exenteration with proctectomy for non-colorectal malignancy and to identify patient, surgical, and pathologic characteristics associated with poor outcomes (specifically disease recurrence and death). Our hypothesis is that patients undergoing operations for palliation and those with positive margins would have worse outcomes when assessing disease-free survival.

Methods/Interventions: Patients who underwent a pelvic exenteration including proctectomy (total and posterior exenteration) for a non-colorectal malignancy primary at a single institution (1995 to 2017) were identified using natural language processing (NLP). Demographic, perioperative, and long-term oncological metrics were collected from the electronic medical record. Patients who were identified as having a recurrence by follow-up imaging or biopsy were compared to those who did not have disease recurrence. Cox regression was used to identify factors associated with disease-free survival.

Results/Outcome(s): 52 patients underwent pelvic exenteration with proctectomy for non-colorectal malignancy (11 posterior and 41 total exenterations). The mean age of the cohort was 60.3 years (SD=14.6) and 78.8% of the patients were female. The average BMI of the patients was 30.4 kg/m² (SD=7.86). Twenty-nine patients (55.8%) underwent pelvic exenteration for recurrent malignancy and 4 (8%) underwent resection with palliative intent. The malignancy origin included the vagina/vulva (15), uterus (10), prostate (6), bladder (4) and ovary as well as sarcoma arising from the pelvis (6). The most common histologic types included squamous cell carcinoma (19), adenocarcinoma (14), and sarcoma (6). The median tumor size was 7.1 cm (SD 4.3)

with few being graded as well-differentiated tumors (7.7%). Overall, 88.5% of patients had an R0 resection margin and five patients (9.6%) had an R1 margin and 1 patient had an R2 resection. Positive margins were identified along the pelvic sidewall or into the retroperitoneum. Lymph node involvement was identified in 11 patients (21%) with 17 patients (32.7%) having lymphovascular invasion. The majority of patients had a history of radiation to the pelvis (67.3%). The average operating time was 8.2 hours. Four patients underwent minimally invasive exenteration (1 laparoscopic and 3 robotic) and 25 patients (48.1%) underwent a flap reconstruction (VRAM, gracilis, or omental flap). Extended resection including sacrectomy or pubic bone resection was required for a complete resection in 7 patients. The median estimated blood loss was 1500 mL (IQR: 925-2725 mL). Intraoperative complications other than hemorrhage occurred in 3 patients (1 external iliac vein injury, 1 external iliac artery injury and 1 obturator nerve transection). The median length of stay was 16.5 days (IQR: 10-21). The overall postoperative complication rate was 69.2% with 15.4% severe complications (Clavien-Dindo class IV) and no 30-day postoperative deaths. The most frequent complication was a superficial wound complication (5 surgical site infections and 7 superficial wound dehiscence). Median follow-up for the entire cohort was 12.1 months (IQR: 5-37) with a median disease free survival was 13.1 months and median overall survival was 37.8 months (see figure). When assessing disease-free survival using cox regression analysis patients had worse outcomes if the operation was performed for palliation (HR 8.18 p=0.014) or if pathology revealed positive resection margins (3.71 p=0.005) or lymphovascular invasion (HR 2.35 p=0.047).

Conclusions/Discussion: Posterior and total pelvic exenteration is performed for locally advanced and recurrent urogynecologic malignancies as well as pelvic sarcomas. With a multidisciplinary surgical team approach and proper patient selection, high negative margin rates can be obtained and long term survival can frequently be achieved. While these operations carry a significant risk of morbidity, they offer patients a chance for prolonged survival and potential cure.



PRESENTATION PATTERN, MOLECULAR FEATURES AND OUTCOMES DIFFER ACCORDING TO TUMOR LOCATION IN EARLY-ONSET COLORECTAL CANCER.

P331

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Purpose/Background: Early-onset colorectal cancer (EOCRC; ≤ 50 years) is on the rise. Although few is known about its pathophysiology, it has been hypothesized that it probably encompasses specific subclasses according to tumor location (right colon cancer-RCC, left colon cancer-LCC, rectal cancer-RC).

Methods/Interventions: Data on patients operated for EOCRC from January 2008 to 2018 were collected from prospectively maintained databases from two Italian referral centers. Molecular and clinical characteristics of EOCRC were analyzed according to tumor location (RCC, LC, RC).

Results/Outcome(s): Out of 3000 CRC operated in this time period, 577 (19.2%) were younger than 50 years at surgery. 155/577 (27%) were in the right colon, 203/577 (35%) in the left colon and 219/577 (38%) in the rectum. Overall, EOCRC represented 11% of colon cancer and 19% of rectal cancers. Male gender was significantly more represented in RC group ($p=0.06$). RC were mainly sporadic while RCC were more associated with family history ($p=0.006$). Rectal bleeding was the main symptom at diagnosis in RC, while bowel occlusion in RCC ($p<0.001$). RC were more advanced at diagnosis (Stage IV 33% vs 8%; $p<0.001$) while RCC were associated with synchronous or metachronous CRCs ($p=0.01$). 5-years overall survival ($p<0.001$) and disease free survival ($p=0.006$) were significantly shorter in RC patients. Microsatellite instability (MSI) was found in 35% of RCC, 18% of LCC; all RC cases were microsatellite stable (MSS) ($p=0.001$). High CpG Island Methylator Phenotype (CIMP) was found in 50% of RCC and 10% of LCC and RC ($p=0.005$).

Conclusions/Discussion: EORCC were mainly associated with family history, synchronous or metachronous neoplasia, lower stage at diagnosis and are associated with better prognosis. At this location CIMP-high is predominant and MSI is rare. EORC are mainly sporadic, diagnosed at advanced stage and have a worse prognosis. Most of them are CIMP 0-low and MSS. EOLRC presented with intermediate characteristics appearing as a transitional or intermediate location. EOCRCs are different entities according to tumor location, this could reflect a different pathophysiology and affect clinical management.

CHARACTERISTICS OF COLORECTAL CANCER IN PATIENTS UNDER 40: FINDINGS OF A NATIONWIDE DATABASE.

P332

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Purpose/Background: Despite the overall decrease in colorectal cancer (CRC) in the United States in most races, the incidence of early onset CRC is increasing significantly. The causes for this rise remain unclear, leading to difficulty in devising screening programs for patients who may be at increased risk. Additionally, while multiple studies have looked at patients diagnosed younger than age 50, little research has been done on patients with very early onset CRC, i.e. those diagnosed before age 40. This research projects looks identifying cancer characteristics in this young population as compared to later onset patients using the National Cancer Database.

Methods/Interventions: The National Cancer Database Colon, Rectosigmoid Junction, and Rectum sub-files from 2010-2015 were reviewed. All patients with adenocarcinoma reported clinical TNM staging were included. Two groups were created, patients less and or equal to 40, and those greater than forty. Over 250,000 patients were included. Demographics, disease characteristics, and patient outcomes were compared between the two groups.

Results/Outcome(s): Patients with very early CRC are significantly more likely to be African American than those over 40 (14.2% vs. 11.9%, $p<0.0001$). Very early CRC has a strong left sided predominance with 78.4% of cancers being left sided, compared to 62.5% of later onset cancers ($p<0.0001$). In addition, very early onset CRC is significantly more likely to be later stage (67.7% vs. 42.3% diagnosed at Stages III and IV, $p<0.0001$), have metastases to liver (31.8% vs. 25.1%, $p<0.0001$), elevated CEA levels (39.9% vs. 35.5%, $p<0.0001$), positive tumor deposits (13.8% vs. 10.7% $p<0.0001$), perineural invasion (14.3 vs. 9.6%, $p<0.0001$), and increased KRAS mutation (9.6% vs. 6.1%, with reported unknown of 74.3% and 84.7%). Very early onset CRC was also noted to have significantly more lymphovascular invasion (24.2% vs. 19.6%, $p<0.0001$).

Conclusions/Discussion: Patients with very early onset CRC are significantly more likely to have left sided colon cancer, be diagnosed at a later stage, and have multiple negative prognostic factors including tumor deposits, perineural invasion, and lymphovascular invasion.

	Patients ≤ 40	Patients >40	Significance
African American Ethnicity	14.20%	11.90%	$p<0.0001$
Left side anatomic location	78.40%	62.50%	$p<0.0001$
Stage III/IV at Initial Diagnosis	67.70%	42.30%	$p<0.0001$
Liver Metastases	31.80%	25.10%	$p<0.0001$
Elevated CEA Levels	39.90%	35.50%	$p<0.0001$
Positive Tumor Deposits	13.80%	10.70%	$p<0.0001$
Perineural Invasion	14.50%	9.60%	$p<0.0001$
Positive KRAS mutation	9.6%	6.10%	$p<0.0001$
Lymphovascular Invasion	24.20%	19.60%	$p<0.0001$

THE CLINICAL UTILITY OF THE SYSTEMIC INFLAMMATORY RESPONSE IN PATIENTS WITH ANAL SQUAMOUS CELL CARCINOMA.

P333

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Purpose/Background: The systemic inflammatory response (SIR) is a negative prognostic measure in several solid malignancies. Its role in anal squamous cell carcinoma (ASCC) is unclear. While primary chemoradiotherapy (CRT) results in cure for many patients, recurrence remains a significant problem, with approximately 30% of patients developing local or distant relapse. Identifying patients at risk of poor outcome at baseline is therefore important. This study determines whether SIR-based scores confer prognostic value in ASCC.

Methods/Interventions: All patients who had a histopathological diagnosis of ASCC treated by primary chemoradiotherapy between December 2007 and February 2018 were identified from a prospectively-maintained pathology database. Clinical data, including treatment modality, recurrence and survival were abstracted from each patient's medical e-record. Recurrence was recorded as local or distant based on imaging and pathology reports combined with the records of multidisciplinary discussions. Cause of death was determined from the clinical record. Pre-treatment values of serum neutrophils, lymphocytes, albumin and C-reactive protein (CRP) were extracted from electronic records. Neutrophil to lymphocyte ratio (NLR) was calculated by dividing the neutrophil count by the lymphocyte count. The modified Glasgow Prognostic Score (mGPS) was recorded as 0 for those patients with an albumin greater than 35 g/L and CRP less than 10mg/L, 1 for those with CRP greater than 10mg/L and 2 for those with albumin values less than 35 g/L and CRP greater than 10mg/L. A score of greater than 0 for mGPS and values greater than 5 for NLR was taken as evidence of systemic inflammation. Univariate Cox regression analysis was used to define the relationship between preoperative clinicopathological features and cancer-specific and overall survival respectively. Variables with a p-value of 0.1 or less were entered in to a multivariate Cox regression model via a backward conditional method. A p-value of less than 0.05 was considered statistically significant.

Results/Outcome(s): During the study period, 207 patients were diagnosed with ASCC. Most were female (67.6%), aged over 65 years (67.6%) and had stage I or II disease (70%). Baseline haematology and biochemistry results were available in 192 and 120 patients respectively. Elevated NLR was present in 19% and elevated mGPS in 34%. High NLR related to increased T-stage ($p<0.05$), N-stage ($p<0.05$) and TNM-stage ($p<0.05$). High mGPS

related to increased T-stage ($p<0.05$) and advanced TNM-stage ($p<0.05$). In those treated by primary chemoradiotherapy, 18 of 137 (14%) developed recurrence (local $n=14$ (10%), distant $n=2$ (2%), both $n=2$ (2%)). Recurrence related to higher T-stage ($p<0.05$), N-stage ($p<0.05$) and TNM stage ($p<0.05$) but not the presence of a systemic inflammatory response. Poorer cancer-specific survival related to older age ($p<0.001$), T-stage ($p<0.001$), N-stage ($p<0.001$) and TNM-stage ($p<0.001$) in addition to high NLR ($p<0.05$) and mGPS ($p<0.05$). On multivariate analysis, age (HR 1.65, $p<0.05$), TNM-stage (HR 1.98, $p<0.05$) and mGPS (HR 1.64, $p<0.05$) remained independently prognostic.

Conclusions/Discussion: Inflammation-based scores have prognostic value in ASCC which is independent of TNM-stage. The modified Glasgow Prognostic Score in particular appears to have clinical utility in identifying patients at risk of inferior cancer-specific survival following treatment for ASCC. Therapeutic manipulation of the SIR as an adjunct to conventional treatment therefore potentially represents an area of consideration in the management of such patients.

THE IMPACT OF OBESITY ON THE MESORECTAL QUALITY IN A LAPAROSCOPIC APPROACH FOR RECTAL CANCER.

P334

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Purpose/Background: The laparoscopic approach takes an important place in the colorectal surgery since 1990. We know that laparoscopy give some advantage for patient, like the recovery. The treatment for rectal cancer is a particularly challenging aspect for the surgeon. The dissection of the mesorectal is an important and crucial part for the cure of the cancer and in the same time is a difficult part of the surgery. Effectively, the quality of the mesorectal is directly linked to the local recurrence of patient and is now an important criterion for the pathological outcome. Also, the obesity makes the surgery more complex for the surgeon. In this study, we want to evaluate the impact of the obesity on the pathological outcome of the specimen. Specifically, the first aim of this study is to evaluate the mesorectum quality according to the Body Mass Index (BMI) for patient with rectal cancer operated by laparoscopy (LS). The secondary goal is to evaluate the recurrence rate, the pathological outcome, the morbidity peri-operative, the anastomotic leak and the early mortality relatively to the BMI of the patient.

Methods/Interventions: This study is a retrospective analyze of all patients operated by laparoscopy between 2003 and 2015 for a rectal cancer. We make a follow up

by phone calls, standardized for all patients. We evaluated the presence of a cancer recurrence, the mortality and the ileostomy closing. We will analyze the cohort in three different groups of body mass index (BMI). First group with a BMI of [0 to 30] second group BMI of [30 to 35] and a third group BMI of [35 and more].

Results/Outcome(s): Between 2003 and 2015, 465 patients were operated by laparoscopy (LS) for a rectal cancer. 348 patients had a BMI [0 to 30], 82 was in the group with BMI[30 to 35] and 35 with BMI [35 and more]. The rectal cancer was evaluating by TNM score. The oncological result show that the mesorectal quality was complete or quasi-complete in 90% (BMI [0 to 30]) vs 91% (BMI [30 to 35]) vs 84% (BMI [35 and more]). More patients with high BMI ([35 and more]) need an ileostomy ($p = < 0.0001$) but no difference for the closing of this one ($p = 0.2188$). No differences in the outcome of a positive radial marge between the three groups ($p = 0.2038$). The 5-years disease free survival was 74.22% (BMI [0 to 30]) vs 76.85% (BMI [30 to 35]) vs 94.29% (BMI [35 and more]). No statistical difference in the morbidity peri-operative between the three groups ($p > 0.05$) excepted for urinary infections ($p = 0.049$).

Conclusions/Discussion: Laparoscopic approach seems to be safe in the surgical treatment of rectal cancer even with patient with high obesity. The oncological outcome is similar and satisfying in the three groups analyzed. Laparoscopic approach has to be considered by experienced surgeon even in the case of obese patients, it can help to have a precise dissection of the mesorectal to give the same chances of cancer cure for all patients.

DEVELOPMENT OF A MULTIDISCIPLINARY COLORECTAL CANCER CLINIC.

P335

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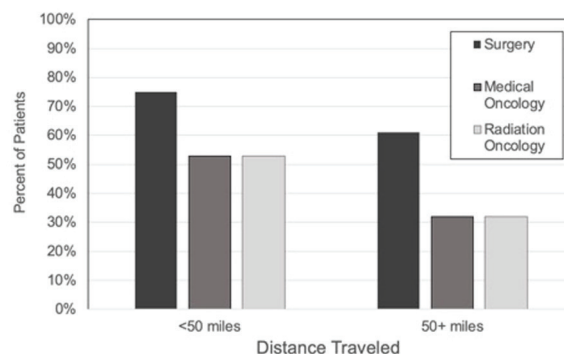
Purpose/Background: Multidisciplinary care is critical for high quality treatment of colorectal cancer. Multidisciplinary Cancer Clinics (MDCs) consolidate multi-specialty care and improve decision-making and efficiency of care from the patient perspective. However, establishing a MDC demands significant infrastructure and may be inefficient for individual providers. Further, MDC-recommended treatment may be delivered entirely, partially, or not at all within the MDC institution, resulting in unequal participation in subsequent patient care among specialties. Therefore, information that enables predictions for program growth over time and by specialty is needed to justify the programmatic and professional time investments required for a successful MDC.

Methods/Interventions: As part of a Quaternary Colorectal MDC established in October 2012, we prospectively collected clinical, demographic, and other data from all patients evaluated in the MDC. We conducted a retrospective cohort study of patients seen from 2012-2016 and used descriptive statistics to analyze patient characteristics, referral patterns, and treatment utilization over time.

Results/Outcome(s): At the time of inception in the final quarter of 2012, the MDC served 57 patients (annualized $n=228$). The MDC volume increased annually, serving 283 patients 2013, and increased by 37% to 387 patients served in 2016. Overall, 404 (23%) of patients were diagnosed with Stage IV colon or rectal cancer. Although the stage mix remained consistent, the percentage of rectal cancer patients increased from 29% of all patients in 2013 to 39% in 2016. At the first MDC visit, 64% of patients saw a colorectal surgeon in initial consultation, 62% saw a medical oncologist, 12% saw a radiation oncologist, and 12% saw a hepatobiliary surgeon. The average number of specialty providers that each patient saw fluctuated over time, but in 2016, 52% of patients saw only one provider, 27% saw two, 16% saw three, and 5% saw four or more providers on initial MDC visit. Overall, 620 (35%) of patients seen in the MDC had surgery within the health system of the MDC, 432 (25%) received chemotherapy there, and 98 (6%) received radiation therapy there. Patients traveled a median of 38 miles (interquartile range: 18 – 86 miles) to be seen in the MDC, and 21% traveled over 100 miles. Patients were more likely to travel to undergo surgery at the MDC institution than to receive chemotherapy or radiation ($p < 0.001$) (Figure).

Conclusions/Discussion: MDCs promote delivery of coordinated multidisciplinary care to colorectal cancer patients. In the first five years of our MDC, we found that new patient volume increased by 37%, and the proportion of patients diagnosed with rectal cancer increased over time. This descriptive study provides data to guide patient and clinician expectations for overall trajectory and evolution of an MDC.

Patients Receiving Specialty Care at the MDC Institution, by Distance Traveled



COMPARISON OF LYMPH NODE HARVEST FOLLOWING EMERGENCY LAPAROSCOPIC VERSUS OPEN COLECTOMY FOR CANCER: AN ACS-NSQIP PROPENSITY-SCORE MATCHED STUDY.

P336

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Purpose/Background: In carefully selected patients, laparoscopy can be a viable option for emergency colon cancer operations. However, there are limited data on the oncological outcomes in this particular setting. This study compares lymph node (LN) harvests of emergency open and laparoscopic colon cancer resections.

Methods/Interventions: After institutional review board approval, the American College of Surgeons National Surgery Quality Improvement Program (ACS-NSQIP) database, was used to identify all patients who underwent emergency colon cancer resections between 2014-2017. The primary outcome was the adequacy of LN harvest (12 or more nodes). Secondary outcomes included surgical site infections (SSI), major morbidity and mortality. We developed a propensity score model to account for confounders using: age, sex, ASA class, major cardiovascular risk factors (smoking, diabetes, hypertension), pre-operative sepsis, elevated white count, transfusion requirement, wound classification, TNM stage, resection type, and indication for emergency surgery. Subjects were matched 1:1 using optimal propensity score matching and groups were then analyzed with logistic regression for categorical variables and the Wilcoxon rank sum test for continuous variables.

Results/Outcome(s): Of 1,512 patients meeting the inclusion criteria, 295 (19.5%) had undergone laparoscopic resection. These patients had significantly lower pre-operative morbidity compared to those undergoing open surgery. Prior to matching, 91.5% of laparoscopic resections achieved an adequate LN harvest compared to 86.7% of open cases ($p=0.023$). Following 1:1 optimal propensity score matching, the final sample size consisted of 590 patients. Logistic regression confirmed groups were well balanced on preoperative risk factors. Post-match analysis showed adequate LN harvests in 91.5% of laparoscopic cases and 90.8% of open cases ($p=0.885$) with an adjusted OR of 1.08 (95% CI 0.73-1.62). The laparoscopic group had longer operative times (148.7 mins vs. 128.9 mins, $p < 0.001$), shorter length of stay (7.5 days vs. 9.7 days, $p < 0.001$), fewer superficial SSI (adjusted OR 0.32, 95% CI 0.17-0.62), and fewer occurrences of pneumonia (adjusted OR 0.40, 95% CI 0.18-0.92). There were no statistically significant differences in deep or organ space SSI, other major morbidity, and mortality.

Conclusions/Discussion: In this large cohort of matched patients who underwent emergency colon cancer operations, laparoscopy did not compromise LN harvest.

In addition, laparoscopy was associated with shorter length of stay, decreased risk of superficial SSI and post-operative pneumonia.

Table 4 – Post-operative outcomes following Propensity Score Matching

Post-op outcomes	Open	Laparoscopic	Adjusted OR (95%CI)	p-value
Observations (n)	295	295		
Superficial SSI	36 12.2%	13 4.4%	0.32 (0.17-0.62)	<0.001
Deep SSI	4 1.4%	2 0.7%	0.45 (0.08-2.52)	0.367
Organ-space SSI	15 5.1%	11 3.7%	0.69 (0.30-1.55)	0.365
Dehiscence	7 2.4%	5 1.7%	0.74 (0.23-2.45)	0.628
Pneumonia	22 7.5%	9 3.1%	0.40 (0.18-0.92)	0.030
Reintubated	7 2.4%	7 2.4%	1.03 (0.5-3.03)	0.957
Pulmonary emboli	10 3.4%	5 1.7%	0.48 (0.16-1.41)	0.181
Failed wean	9 3.1%	2 0.7%	0.26 (0.05-1.23)	0.089
AKI	2 0.7%	2 0.7%	1.15 (0.14-9.63)	0.892
UTI	12 4.1%	8 2.7%	0.57 (0.22-1.49)	0.250
CVA	2 0.7%	1 0.3%	0.55 (0.04-7.88)	0.751
Cardiac arrest	3 1.0%	1 0.3%	0.29 (0.03-2.95)	0.301
MI	4 1.4%	1 0.3%	0.25 (0.03-2.50)	0.240
DVT	10 3.4%	5 1.7%	0.44 (0.15-1.36)	0.155
Sepsis	18 6.1%	15 5.1%	0.87 (0.43-1.78)	0.703
Septic shock	9 3.1%	3 1.0%	0.37 (0.09-1.50)	0.163
Reoperation	19 6.4%	17 5.8%	0.87 (0.43-1.76)	0.708
Death	12 4.1%	7 2.4%	0.69 (0.26-1.89)	0.480
Anastomotic leak	9 3.1%	9 3.1%	0.94 (0.36-2.42)	0.891
Adequate LN harvest	268 90.8%	270 91.5%	1.08 (0.73-1.62)	0.772
Mean nodes evaluated	19.6	19.7		0.863
OR time	128.9	148.7		<0.001
Length of stay	9.7	7.5		<0.001

ENHANCED ANOSCOPY IN DETECTION OF ANAL SQUAMOUS INTRAEPITHELIAL LESIONS.

P337

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Purpose/Background: American Cancer Society estimate 8,580 new cases of anal cancer and 1,160 deaths in 2018. Pathophysiology predominantly caused by HPV particular subtypes 16/18. Spectrum of infected epithelium progresses from dysplasia to carcinoma. Precursor lesions described histologically as anal intraepithelial neoplasia (AIN) graded 1,2 and 3. Cytologically termed anal squamous intraepithelial lesion; low grade (LSIL) or AIN 1 and high grade (HSIL) AIN 2 and 3. Demonstration of LSIL/HSIL prompts evaluation with high resolution anoscopy (HRA) and biopsy, dictating treatment. Cervical CA is used as a model for anal CA regarding screening and diagnosis. Application of acetic acid allows for visualization of abnormalities in the squamous epithelium as acetowhite lesions (AWL). The addition of Lugol's solution to AWL will stain glycogenated squamous epithelium. High grade lesions lack glycogen they do not stain and are Lugol's negative.

Methods/Interventions: Patient selection Retrospective analysis of 69 patients from 7/2013 to 1/2018. All patients underwent anorectal examination under anesthesia with intent to treat suspicious lesions. Examination was performed by an attending surgeon at a tertiary hospital. Procedure Under general anesthesia, patients were placed in prone jackknife. Digital anorectal exam was performed, Pratt anal retractor was used to note presence of obvious lesions (condyloma, polyps, etc). Next gauze soaked in 3%

acetic acid was inserted and left for one minute to saturate the mucosa. Repeat anoscopy was performed. Areas with white discoloration were noted to be "acetowhite" with particular attention to the transformation zone. Additional testing was performed with addition of Lugol's solution. Additional visual criteria used were contour, texture, and or irregular margins. Suspicious acetowhite lesions (AWL) were excised and/or fulgurated. Specimens were sent for permanent pathologic evaluation in formalin.

Results/Outcome(s): Sixty-nine patients examined with total of 139 AWL in 66/69 (95.65%), average 2 AWL per patient with max of 6 lesions. There were 3/69 patients with no AW lesions: One had previous hx of superficial invasive SCC of anus (despite no AWL, scar consistent with invasive SCC. One patient had condyloma with LSIL One with simple condyloma without dysplasia Approximately 94% 62/66 patients had dysplasia totaling 113/139 AWL (81.3%) There were 4/66 patients without dysplasia in 6 AWL One had p-AIN1 condyloma, VIN3 and CIN2 One had history of in situ squamous cell carcinoma One had ASCUS on anal pap One with history of multiple HSIL in HIV+ HSIL was found in 31/62 pts (50%) Total of 43/139 AWL (31%) AIN 2 20/43 AWL (46.5%) AIN 3 23/43 (53.5%) LSIL in 48/62pts (77.4%) Total of 70/139 (50.4%) HSIL + LSIL was found in 17/62 (27.4%) One AWL was found to have invasive carcinoma (0.72%)

Conclusions/Discussion: Colposcopic criteria used to distinguish suspicious cervical lesions applied to anorectal examination to better identify anal LSIL and HSIL. Use of acetic acid +/- Lugol's staining can further aid in identification of high risk lesions in the anal transformation zone. Use of micro/colposcopy termed high resolution anoscopy (HRA) can increase the likelihood of identifying HSIL. Previously demonstrated high resolution anoscopy features including flat contour, mosaic vascularity, and negative Lugol's staining when applied to acetowhite lesions were most predictive of HSIL. Lugol's negative staining AWL is practical to observe without the assistance of magnification and is feasible to perform during rectal examination under anesthesia. Our data indicates the utility of AWL has good specificity (82% of AWL had some dysplasia). In all condyloma patients some dysplasia was identified; 12/23 patients had HSIL (52.2%) and over one fourth had AIN3/Ca in situ. This demonstrates that HRA is not necessary to obtain proper tissue diagnosis after abnormal cytology. This may identify patients who need closer monitoring to reduce incidence of invasive anal SCC. In cases where HRA is not available or readily accessible (equipment/training), it may be more feasible for enhanced anoscopy to be performed. The concepts of enhanced anoscopy is not intended to replace HRA rather to be used as a tool to restage and monitor this patient population. As new magnified anoscopes are more commercially available this adjunct can be used to improve sensitivity and specificity during time of surgery. Our single institution study further

validates this process in a low cost manner without need for additional equipment, training and does not prolong OR time. Patients at risk for abnormal anal pathology represent difficult clinical cases as not all lesions may be identified and/or biopsied. The addition of acetowhite and lugol staining with visual criteria may assist in yielding the highest grade lesions. Systematic evaluation helps guide lesions chosen for treatment and maximize the likelihood of finding early malignancy.

ONCOLOGIC AND SURGICAL OUTCOMES OF PELVIC EXENTERATION FOR LOCALLY INVASIVE PRIMARY AND RECURRENT RECTAL CANCER.

P338

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Purpose/Background: Combined proper surgical technique and total mesorectal excision with neoadjuvant chemoradiation led to a decline in local recurrence rates for locally invasive rectal cancer. However, approximately 6% of rectal cancers present invading adjacent organs requiring a beyond TME resection to achieve an R0 resection. Unfortunately, even for potentially resectable locally recurrent rectal cancers (RRC) and locally invasive primary rectal cancer (LIRC), rates of R0 resection range between 37% and 57%. This study aimed to compare the postoperative and oncological outcomes between R0 resection and non-R0 resection in pelvic exenteration for LIRC and RRC in a tertiary referral center.

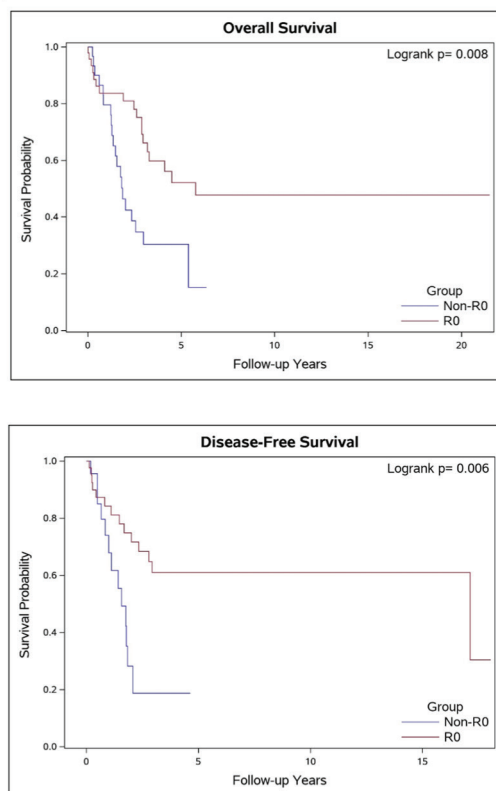
Methods/Interventions: Retrospective analysis of a prospectively maintained database of consecutive patients undergoing surgery for LIRC or RRC between January 1997 and October 2015 were included. Those undergoing exenteration for non-colorectal solid tumors or benign retrorectal tumors were excluded. All operations were performed by a specialist colorectal surgery team, with support from surgical oncology, orthopedics, urological, gynecological, and plastic surgeon specialists on a case-by-case basis. Patients were divided into two groups: those who had an R0 surgery and those who had a non-R0 surgery (R1 and R2). The primary outcomes were overall survival (OS) and disease-free survival (DFS). Secondary outcomes were perioperative outcomes.

Results/Outcome(s): From a total of 82 pelvic exenterations, 49 (60%) were R0 and 33 (40%) were non-R0. There was no difference in demographic characteristics between the groups. Non-R0 group had more patients receiving treatment for recurrent rectal cancer (64 vs. 39%, $p=0.02$). There was no difference in neoadjuvant treatment between the groups. R0 group had more patients undergoing surgery with curative intent (98% vs. 79%, $p=0.004$). Intraoperative blood loss was higher in the R0

group (2100ml vs. 1000ml, $p=0.02$). At the time of the surgery, more patients in the non-R0 group had distant metastasis (33% vs. 6%, $p=0.001$) and were having surgery for symptom palliation or cytoreduction (including metastasectomy). Postoperative complications (77 vs. 78%, $p=0.89$) and Clavien-Dindo classification ($p=0.41$) were comparable among both groups. There was no difference in adjuvant treatment regimens. Overall recurrence was more frequent in non-R0 group (39 vs. 29%, $p=0.01$). The R0 group had significantly better 3-year overall survival ($p=0.008$) and disease-free survival ($p=0.006$) (Figure). On the multivariate analysis, only estimated blood loss > 1500 ml was associated with R0 resection (OR 1.0004, CI95% 0.08 – 1.04, $p=0.04$).

Conclusions/Discussion: In this single-center retrospective study, patients undergoing pelvic exenteration had achieved R0 status in many cases with low perioperative mortality and acceptable morbidity. Pelvic exenteration by an experienced multidisciplinary team is a reasonable strategy for cure or symptom relief of these challenging patients with no alternative. R0 surgery was associated with a better oncological outcome.

Figure – Kaplan-Meier curves for Overall Survival and Disease-Free Survival



DEEP LEARNING TO PREDICT RESPONSE TO NEOADJUVANT CHEMORADIATION IN LOCALLY ADVANCED RECTAL CANCER USING THE INITIAL STAGING PELVIC MRI.

P339

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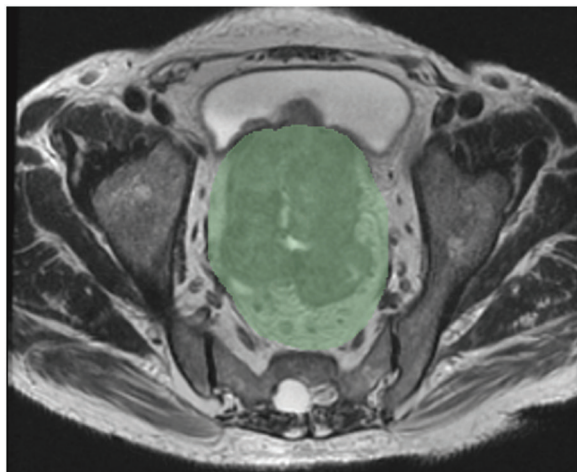
Purpose/Background: The pathologic stage in patients undergoing curative resection of locally advanced rectal adenocarcinoma after neoadjuvant chemoradiotherapy (nCRT) correlates with overall survival (OS). A-priori surrogate endpoints for OS are lacking. Deep learning using convolutional neural networks (CNN), a branch of machine learning and artificial intelligence, has shown great potential in extracting patterns from data and images to solve complex problems. Prior studies applied machine learning techniques to detect complete clinical response on post-treatment Magnetic Resonance Imaging (MRI). No work to date has used a deep learning CNN to help predict the response to therapy in rectal cancer. Our goal was to perform a proof of concept study to investigate whether deep learning can predict the surgical pathologic T stage after nCRT (ypT).

Methods/Interventions: Consecutive patients with rectal cancer treated at a tertiary referral center between 2010-2018 were identified from prospectively maintained multidisciplinary divisional databases. Patients with biopsy proven rectal adenocarcinoma who had an initial staging pelvic MRI, standard of care nCRT (5040 cGY + capecitabine) and curative surgery were included. The entire tumor and mesorectal compartment were separately segmented on the T2 weighted sequence by an experienced subspecialized radiologist. A CNN with 3 convolutional blocks was built, then evaluated for training and validation on separate patients. Due to the small cohort, ypT stages were binned into 2 cohorts: 0, 1, 2 and 3,4. The CNN was run separately on the segmented tumor and the entire mesorectal compartment. The surgical ypT stage was used as the reference standard. The main outcome measure was the ability of the CNN to predict the ypT stage from the pretreatment MRI.

Results/Outcome(s): 67 patients were included in the study. The cohort was 66% male and had a median age of 63 years at surgery. The median time from the end of nCRT to surgery was 8.7 weeks. There were 2, 49 and 16 clinical T stage 2, 3 and 4 tumors respectively. There were 5, 5, 21, 34 and 2 ypT 0, 1, 2, 3 and 4 tumors at surgery respectively. The CNN trained on the tumor resulted in training and validation accuracies of 87% and 38% respectively. The CNN trained on the entire mesorectal compartment resulted in training and validation accuracies of 93% and 71% respectively.

Conclusions/Discussion: Based on our pilot study, deep learning has potential to predict the post neoadjuvant

chemoradiotherapy pathologic stage at curative surgery from the initial staging pelvic MRI. Knowing how a patient will respond to neoadjuvant chemoradiotherapy before surgery has the potential to personalize and change the patient's treatment course. Information contained within the entire mesorectal compartment may be more predictive than that of just the tumor itself. These results serve as a proof of concept to apply in larger controlled trials.



AGGREGATE MORBIDITY AND MORTALITY OF DEFUNCTING LOOP ILEOSTOMIES FROM FORMATION TO CLOSURE: A LARGE POPULATION RETROSPECTIVE COHORT ANALYSIS.

P340

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Purpose/Background: The use of defunctioning loop ileostomies (DLI) has increased significantly in the last decade as colorectal surgeons opt to preserve bowel continuity after rectal cancer resection. While recent literature has demonstrated significant morbidity associated with DLIs in terms of renal failure, bowel obstructions, hernias, and quality of life metrics, no study has evaluated the aggregate morbidity and mortality associated with DLIs from formation to following closure. The aim of this study is to determine total morbidity and mortality of defunctioning loop ileostomies, and to compare both perioperative and long-term outcomes in patients undergoing low anterior resection with and without an ileostomy.

Methods/Interventions: All adult patients who underwent low anterior resection (LAR) with or without a DLI from 2002-2014 were identified through Ontario Health Insurance Plan (OHIP) surgeon billing codes and Canadian Institute of Health Information (CIHI) procedural codes. We used full population data and not sampled data. Patient demographics, comorbidities, surgeon/hospital information,

and outcomes of interest were collected. Outcomes of interest included: mortality, major complication, hospital re-admission, re-operation, hospital length of stay and days spent in hospital, bleeding requiring transfusion, deep space infection requiring percutaneous intervention, acute renal failure requiring hospitalization, bowel obstruction, hernia, and rate of permanent ostomy. The patient cohort was divided into subgroups of rectal cancer and non-rectal cancer patients. Descriptive analysis was performed on demographics and outcomes of interest. Univariate and multivariate regression analysis were performed on outcomes.

Results/Outcome(s): A total of 25,491 patients underwent LAR from 2002-2014. Of those, 4,658 patients had a concomitant ileostomy (18.3%). Of the cohort, 6,146 were rectal cancer patients - 2,700 (43.9%) had an ileostomy and 3,446 (56.1%) did not. The proportion of patients with ileostomies increased by 300% from 2002-2013 (8.7% to 25.6%). In 2013, 55.8% of rectal cancer patients had a DLI with their LAR. For rectal cancer patients, the ileostomy group had significantly more major complications (OR 1.24 95% CI 10.7-1.42; $p = 0.004$), readmission (OR 1.57 95% CI 1.34-1.83, $p < 0.0001$), and renal failure requiring hospitalization (OR 4.15 95% CI 3.14-5.47, $p < 0.0001$) after risk adjusted analysis. The ileostomy group was protective against reoperation (OR 0.53 95% CI 0.39-0.72; $p < 0.0001$) and 1-year mortality (OR 0.77 95% CI 0.59-1.00; $p = 0.004$). There was no difference between deep space infection requiring percutaneous intervention or bleeding requiring blood transfusion. Ileostomy patients spent significantly more days in hospital both 30 days after index surgery and one year after index surgery [10 days (IQR 8-15 days) vs 8 days (IQR 7-12 days), $p < 0.001$ at 30 days; 18 days (IQR 13-26 days) vs 9 days (IQR 7-17 days), $p < 0.001$ at 1 year]. For non-rectal cancer patients, the ileostomy group had significantly more morbidity in all outcome measures without any mortality benefit. Ileostomy patients also spent significantly more days in hospital [11 days (IQR 8-16 days) vs 8 days (IQR 6-10 days), $p < 0.001$ at 30 days; 19 days (IQR 14-29) days vs 8 days (IQR 6-14 days), $p < 0.001$ at 1 year]. After ileostomy reversal, 10.3% of patients had major complication(s), 10.5% developed ventral hernias, 7% developed bowel obstruction, and 2.3% of patients required a repeat LAR or ileostomy within 30-days of ileostomy reversal. Thirteen percent of patients had permanent ostomies.

Conclusions/Discussion: This is the one of the largest population-based studies evaluating morbidity associated with DLIs, and the only study evaluating aggregate morbidity and mortality of DLIs from formation to after closure. DLIs are associated with significant morbidity. For rectal cancer patients, ileostomies were independently associated with reduced 30-day re-operation and 1-year mortality but significantly higher overall morbidity. No benefit was seen in non-rectal cancer patients. Highly selective utilization of DLI for patients at highest risk for anastomotic leak should be analyzed and implemented in the future.

METASTATIC COLON CANCER AND THE IMPORTANCE OF PRIMARY TUMOR LATERALITY – AN NCDB ANALYSIS OF RIGHT-VERSUS LEFT-SIDED COLON CANCER.

P341

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Purpose/Background: Recent studies have brought increasing awareness to the differences in survival outcomes in patient with primary right- (RCT) versus left-sided colon tumors (LCT). It is well-established that the specific pattern of distant organ involvement in patients with metastatic disease influences survival outcomes. However, there is a dearth of information whether: 1) these patterns vary according to the laterality of the primary colon tumor; 2) the differential outcomes in RCT versus LCT are due to different patterns of metastatic spread, differences in treatment, or distinctions in inherent tumor characteristics.

Methods/Interventions: We analyzed the National Cancer Database from 2010 to 2015 for all patients with colon adenocarcinomas who developed synchronous or metachronous liver, lung, peritoneal, bone, and brain metastases. We dichotomized the primary tumor site into right colon (cecum thru transverse colon) versus left colon (splenic flexure to sigmoid colon) based upon their differential embryologic origins (midgut versus hindgut) and vascular supplies (superior versus inferior mesenteric artery). We compared the likelihood for specific characteristics using the chi-square test. We compared overall survival using Kaplan-Meier and log-rank test analysis. Lastly, we explored predictors for overall survival using univariable and multivariable Cox proportional hazards analyses.

Results/Outcome(s): In our analysis, 57,633 (16.2%) patients with colon cancer had metastatic disease to the liver, lung, peritoneum, bone, or brain. While LCT were more likely to metastasize to any site as compared to RCT (18.0% versus 15.0%, OR 1.25, p<0.001), patients with metastases from LCT had significantly longer overall survival (21.5 versus 13.2 months, p<0.001). The patterns of metastases were distinct. LCT were more likely to metastasize to liver (83.4% versus 80.6%, OR 1.21, p<0.001) and lung (23.0% versus 20.6%, OR 1.15, p<0.001), whereas RCT were more likely to metastasize to the peritoneum (36.1% versus 32.1%, OR 1.20, p<0.001) and brain (1.5% versus 1.3%, OR 1.19, p=0.014). There was no difference in the likelihood to metastasize to bone (4.7% for both). Overall survival was longer for LCT metastases compared to RCT for patients with metastases to the liver (21.9 versus 13.0 months, p<0.001), lung (16.3 versus 10.4 months, p<0.001), peritoneum (15.9 versus 11.4 months, p<0.001), bone (8.3 versus 5.4 months, p<0.001), and brain (5.8 versus 4.6 months, p=0.044). In terms of tumor biology, RCT were more likely to have signet ring (OR 2.12, p<0.001) or mucinous cell histology (OR 1.61,

p<0.001), to have a KRAS mutation (OR 1.82, p<0.001), to have microsatellite instability (OR 1.47, p<0.001), and to be high grade (OR 1.89, p<0.001). RCT were more likely to be resected (OR 1.10, p<0.001), but there was no difference in the resection rates of metastatic sites. Patients with RCT were more likely to have ≥12 lymph nodes examined (OR 1.30, p<0.001) and to have positive lymph nodes (OR 1.33, p<0.001) from the primary colon resection. There was no difference in the rate of negative margins. Patients with LCT were more likely to undergo any type of chemotherapy (OR 1.42, p<0.001) and radiation (OR 1.40, p<0.001). Univariable and multivariable Cox regression analyses are shown in Table 1. After controlling for multiple variables, RCT (HR 1.426, p<0.001) remained an independent predictor of worse overall survival compared to LCT.

Conclusions/Discussion: This large population study suggests that metastatic right and left colon cancers are distinct entities, with differential metastatic distributions, tumor characteristics, and survival outcomes. There are several potential reasons for the poorer survival seen in metastatic RCT. We found that RCT tended to exhibit high-risk features and were more likely to metastasize to locations associated with poorer survival (e.g. peritoneum, brain). However, despite controlling for metastatic site and other factors, RCT continued to have worse overall survival compared to LCT. This suggest that there may be other unmeasured factors that contribute to the poorer survival in metastatic RCT. Future studies are warranted to delineate the biologic and clinical differences between right- and left-sided colon cancers, with the goal of further tailoring treatment for these distinct groups of patients.

Variable	Univariable			Multivariable		
	P-value	HR	95% CI	P-value	HR	95% CI
Age	<0.001	1.027	1.026 – 1.028	<0.001	1.012	1.009 – 1.015
Female Gender ^a	0.319	-	-	-	-	-
Charlson-Deyo Score						
0	Ref.	-	-	Ref.	-	-
1	<0.001	1.225	1.194 – 1.571	0.245	-	-
2	<0.001	1.562	1.492 – 1.635	0.018	1.281	1.043 – 1.573
≥3	<0.001	1.924	1.802 – 2.053	<0.001	1.913	1.442 – 2.537
Race						
White	Ref.	-	-	Ref.	-	-
Black	0.165	-	-	0.913	-	-
American Indian	0.914	-	-	0.060	-	-
Asian/Pacific Islander	<0.001	0.851	0.798 – 0.907	0.314	-	-
Other	<0.001	0.794	0.723 – 0.873	0.118	-	-
Academic Center	<0.001	0.811	0.792 – 0.829	<0.001	0.850	0.778 – 0.928
Liver Metastasis ^b	0.564	-	-	<0.001	1.500	1.337 – 1.683
Lung Metastasis	<0.001	1.302	1.270 – 1.335	0.086	-	-
Peritoneal Metastasis	<0.001	1.331	1.303 – 1.360	<0.001	1.366	1.245 – 1.500
Bone Metastasis	<0.001	1.898	1.813 – 1.988	0.001	1.471	1.179 – 1.835
Brain Metastasis	<0.001	1.936	1.785 – 2.099	<0.001	2.033	1.402 – 2.948
Signet Ring Histology	<0.001	1.616	1.511 – 1.729	<0.001	1.665	1.288 – 2.154
Mucinous Histology ^a	0.061	-	-	0.014	1.181	1.034 – 1.348
KRAS Mutation	<0.001	1.094	1.055 – 1.133	0.083	-	-
Microsatellite Instability	<0.001	1.196	1.118 – 1.279	0.068	-	-
High-Grade Tumor	<0.001	1.567	1.528 – 1.606	<0.001	1.477	1.354 – 1.612
Primary Tumor Resected ^c	<0.001	0.484	0.474 – 0.495	<0.001	0.420	0.352 – 0.500
Non-Primary Tumor Resected	<0.001	0.566	0.551 – 0.582	<0.001	0.782	0.714 – 0.856
≥12 Lymph Nodes Examined	<0.001	0.518	0.507 – 0.529	<0.001	0.780	0.694 – 0.876
Positive Lymph Nodes	<0.001	0.725	0.710 – 0.740	<0.001	1.655	1.473 – 1.859
Chemotherapy	<0.001	0.303	0.296 – 0.310	<0.001	0.409	0.366 – 0.457
Radiation Therapy	0.002	1.088	1.033 – 1.145	0.069	-	-
Primary Site						
Left/Sigmoid Colon	Ref.	-	-	Ref.	-	-
Right/Transverse Colon	<0.001	1.418	1.389 – 1.449	<0.001	1.426	1.308 – 1.555

Table 1. Univariable and Multivariable Cox Proportional Hazards Analysis for Predictors of Overall Survival in Metastatic Right- Versus Left-Sided Colon Cancer.

^aLevel of significance for inclusion into multivariable model set at p>0.20

^bForced into model

^cNegative margins not included due to collinearity with resection of the primary tumor

RECURRENCE RISK FACTORS AFTER INFRARED COAGULATION FOR HIGH-GRADE ANAL INTRAEPITHELIAL NEOPLASIA.

P342

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Purpose/Background: Anal cancer screening using anal cytology and high-resolution anoscopy (HRA) according to its results, is key to the detection of premalignant lesions (high-grade anal intraepithelial neoplasia). After the diagnosis of these lesions they are managed by ablative treatment. There are several ablative therapies but infrared coagulation as an office-based treatment has been evolved as one of the standard treatment for this clinical disorders. However, recurrence is common after treatment of anal intraepithelial neoplasia. To assess risk factors of recurrence after anal dysplasia treatment in an HIV- infected population.

Methods/Interventions: The protocol of screening program for anal cancer prevention in our unit was created at 2004. The baseline visit of the screening program includes a clinical examination (visual inspection) including a digital rectal examination and to obtain a sample from the anal canal for cytological examination. After this first anal canal cytology, if the result was normal, the participant was visited again one year after, but if this one was abnormal (ASCUS, LSIL, o HSIL), the patient was informed and high-resolution anoscopy (HRA) was programmed before 3 months. If lesions were not visualized with HRA, no biopsy was done, and depending on the previous cytological result; a new visit including cytology was programmed for 6-12 months after. If lesions were visualized with HRA, a directed biopsy was performed for histological analysis. If this one was normal or AIN1, a new visit including a cytology test was scheduled for 6 months after, but if the result were AIN2 or AIN3, the patients were informed and treated with infrared coagulation. After treatment, the patients were visited (including cytological examination) again at 3-6 months later. If the anal canal cytological result was normal, the participant was visited again at 6-12 months later, but if the result was abnormal (ASCUS, LSIL or HSIL) a new HRA was performed as early as possible. We designed a retrospective single-centre, descriptive analysis of our recurrence results after the treatment of high-grade anal intraepithelial neoplasia (HGAIN) in a HIV-infected population from 2005 and 2015. They were all treated with infrared coagulation. Epidemiologic data were recollected from all the patients that recurred and from those who did not. Recurrence was defined as any HGAIN diagnosed at follow-up. Anal cytology and human-papillomavirus- infection (HPV) was assessed. Study variables were: age, gender and sexual

habits, presence of Hepatitis C Virus antibodies, Nadir CD4 cell account and current CD4 cell account at the time of HGAIN diagnose, Zenit viral load and current viral load at the time of HGAIN diagnose, presence of High Activity Antiretroviral Therapy (HAART), presence or absence of Low or High risk HPV-genotype including presence of HPV 16, number of HPV at first cytology and number of lesions at High-Resolution Anuscopy. A comparative statistical analysis of variables associated to recurrence after HGAIN treatment had been undertaken. A multivariate analysis was also done to identify risk factors for recurrence using a logistic regression test. A bilateral p value less than 0.05 was considered statistical significant

Results/Outcome(s): From January 2005 to December 2014 193 patients were treated for HGAIN. Of those 71,5% were Men who have Sex with Men (MSM), 7,2% were Men Who have Sex with Women (MSW), 19,8% were Women and 1,4% were Transgender. The mean age was 42,67 years-old. A total of 60 patients recurred (31,1%), with median recurrence time at follow-up of 8,50 months (2-63m). On the table below it is shown the comparative results in patients with and without recurrence. There were a significant differences in the Nadir CD4 cell count comparing the group with recurrence to the group without recurrence (250,61 vs. 184,68, $p=0,008$). Also in the group with recurrence there was a higher prevalence of HPV16 (42,7% vs. 64,7%, $p=0,007$) and patients were older (45,75y vs. 41,06, $p=0,004$). There were also differences between the Zenit viral load and the current Viral Load at the time of the first HGAIN in the two groups (16.889 vs. 237.610, $p=0,390$ and 9.336 vs. 180.839, $p=0,440$). 52,6% of the women was HVC positive comparing to the 11,8% of the men ($p<0,001$). But if we stratify to those men that were parenteral drug users (PDU), 55,6% of them was HVC+. Finally a multivariable analysis was performed with those variables with statically signification finding that patients having an age over 40 and the presence of VPH have more risk of recurrence after treatment (OR of 2,677, [CI: 1,294-5,538], $p=0,008$ and 2,696, [CI: 1,33-5,45], $p=0,006$, respectively).

Conclusions/Discussion: Recurrence after treatment of HGAIN is common in our population. The prevalence of HPV16 is high and it is related to recurrence of HGAIN. A careful follow-up is needed in these patients, especially those over 40 years.

	Global	Patients without HGAIN recurrence	Patients with HGAIN recurrence	P
Basic epidemiology				
Age (years)	42,52	41,06	45,75	0,002
Women	20,7 %	19,5 %	23,3 %	0,403
HSM	7,23 %	9 %	3,4 %	0,403
HSH	70,5 %	72,1 %	70,0 %	0,403
Transexual	1,6 %	0,8 %	3,3 %	0,403
HIV-infection variables				
Hepatitis C	20 %	19,8 %	20,3 %	0,548
Nadir CD4 cell count (cell/μL)	230,11	250,61	184,68	0,008
Current CD4 cell count (cell/μL)	574,31	596,83	524,69	0,100
Antiretroviral treatment	91,7 %	91,7 %	91,7 %	0,996
Current Viral Load	11,694	9,336	180,839	0,440
Zenit Viral Load	198,488	16,889	237,610	0,390
Anal dysplasia data				
HPV 16	49,4 %	42,6 %	64,7 %	0,007
High oncogenic risk HPV at HGAIN treated	97 %	95,7 %	100 %	0,155
Low oncogenic risk HPV at HGAIN treated	32,7 %	31,6 %	35,3 %	0,383
More than 1 HPV at HGAIN treated	88 %	87 %	90,2 %	0,379
No HPV at HGAIN treated	2 %	2 %	0 %	0,290
Mean number of HPV at HGAIN treated	4,28	4,26	4,31	0,906
More than 1 lesion in HRA at HGAIN treated	12,8 %	12,5 %	13,3 %	0,521

CAN SURVIVAL BE IMPROVED BY MEETING THE STANDARDS OF THE NATIONAL ACCREDITATION PROGRAM FOR RECTAL CANCER?

P343

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Purpose/Background: The National Accreditation Program for Rectal Cancer (NAPRC) was developed to improve rectal cancer patient outcomes in the United States. NAPRC consists of a set of process and performance measures that hospitals must meet in order to be accredited. We aimed to evaluate whether achievement of these measures predicts improved survival in a cohort of patients recently entered into the National Cancer Database.

Methods/Interventions: The National Cancer Database (NCDB) was used to identify patients undergoing curative proctectomy for non-metastatic rectal cancer from 2010-2014. NAPRC process measures identified in the NCDB included clinical staging completion, treatment starting <60 days from diagnosis, CEA level drawn prior to treatment, tumor regression grading, and margin assessment. Performance measures captured in NAPRC included negative proximal, distal and circumferential resection margins (CRM), and ≥12 lymph nodes harvested during resection.

Results/Outcome(s): There were 48,669 patients identified with a mean age of 62±12.9 and 61.3% of patients were male gender. The majority (80.6%) of patients were treated at urban centers with most having a mean annual resection volume of 10 procedures or less (68.4%). The process measure completed most often was assessment of proximal and distal margins (98.4%) and the measure completed least often was the serum

carcinoembryonic antigen level prior to treatment (63.8%). All process measures were completed in 23.6% of patients. Proximal and distal margins were negative in 93.4% of patients; the CRM was negative in 82.5% of patients and ≥12 lymph nodes were assessed in 72.4% of patients. All performance measures were achieved in 55.7% of patients. On univariable Cox regression, completion of all process measures was associated with increased odds of survival (mortality HR 0.74, CI 0.70-0.79, p<0.001). Achievement of all performance measures was also associated with increased odds of survival (mortality HR 0.66, CI 0.63-0.69, p<0.001). After controlling for age, gender, comorbidities, neoadjuvant and adjuvant therapy, completion of all process measures did not correlate with a statistically significant survival benefit (mortality HR 0.92, CI 0.81-1.05, p=0.22). Achieving all performance measures did correlate with improved survival (mortality HR 0.63, CI 0.58-0.68, p<0.001).

Conclusions/Discussion: A small percentage of patients completed all process measures and just over half of patients achieved all performance measures. While achieving all performance measures did correlate with improved survival, completion of all process measures did not correlate with a statistically significant survival benefit. If adoption of NAPRC process measures leads to improved performance, then survival rates for U.S. rectal cancer is likely to increase. The NAPRC could save as many as 1600 lives annually in the U.S.

CLINICOPATHOLOGIC CHARACTERISTICS OF SPORADIC YOUNG KOREAN COLORECTAL CANCER PATIENTS: COMPARISON WITH OLDER PATIENTS.

P344

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Purpose/Background: The colorectal cancer is 3rd most common malignancy all over the world which is increasing among persons 40 years old or younger. In contrary to a recent overall decrease in colorectal cancer incidence and mortality in western countries there has been a significant increase in colorectal cancer diagnoses in over population of South Korea, especially in younger than 40. However, epidemiology of young onset colorectal cancer are not well studied. This study was aimed to investigate tumor behavior and outcome in sporadic colorectal cancer in young patient (age<40) by comparison with middle and late onset colorectal cancer patients.

Methods/Interventions: Data from prospective colorectal cancer registry for patient diagnosed as colorectal cancer were retrospectively collected from 2006 to 2016. All eligible patients were categorized as three group according to age(group 1: age≤40 years, group 2:

41-65 year, group 3: more than 66). SPSS software used to compare patients' clinicopathological characteristics with chi square, ANOVA test and analyze long term survival with Kaplan Meier curve and log rank test.

Results/Outcome(s): A total number of 6773 patients were included Group I (N=264, mean age=34), II (N=3735, mean age=55), group III (n=2774, mean age=72) with mean age of each group was (34.2,55.8,72.9) respectively. The tumor location showed highest incidence for sigmoid colon among all groups (34%, 35.4%, 35%) respectively. Regarding the depth of tumor (T), the analyzed data showed that T3 is the most frequent in all categories. Further descriptive analysis revealed that group I have more lymphovascular invasion (34%, 23.3%, 22% p value=0.001) respectively. Also, high Microsatellite instability tend to present in high percentage in group I (8.7%,3%,2.5% p value=0.010). There is no significant difference in recurrence rate between three groups (25%, 20%, 21% p value=0.674). Family history of malignancy other than inherited colorectal cancer showed high presentation in group I (33.8%, 16.7%, 11.4% p value=0.001). 5 year overall and disease free survival showed no significant difference between group II and III but there is difference between group I and the other two group in stage IV (DFS<40y=42.3% and OS<40y=46.2% while DFS>40y=75% and OS>40y=76.6%). young patient with stage IV usually present by multi organ metastasis 36% while old age group with stage IV with multi organ metastasis 6%.

Conclusions/Discussion: Based on our data there is no significant difference between group II and III but the difference exists between group I and other two groups. Result delineate that young age have not only aggressive colorectal, but also disease related death and overall survival. From clinical perspective an efficient screening

method and adequate knowledge about risk factors in young patient are lacking. Also, lack of insight about malignancy among young patient with rapidly growing and increasing incidence of colorectal cancer should collaborate effort for more molecular biologic research about this phenomenon.

3D LAPAROSCOPIC RESECTION FOR LOW RECTAL CANCER WITH TRANSRECTAL SPECIMEN EXTRACTION SURGERY.

P345

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Purpose/Background: This video presents an operation that 3D laparoscopic resection for low rectal cancer with transrectal specimen extraction surgery

Methods/Interventions: A 5-port technique is employed. With a middle approach, the medial side of the sigmoid mesocolon was dissected for exposure of Toldt's space. Then the inferior mesenteric artery was clipped and cut off. The posterior gap, the lateral rectal ligament and Denovillier fascia were successively dissected. After rectum mobilization, distal rectum were divided using Endo-GIA. Close the rectal cavity by purse suture with a distance of 2cm below the tumor. The rectum were divided close to the suture. A protective sleeve were inserted to abdominal cavity and pulled out transrectal. The anvil head of the circular stapling were inserted from the anus, and the specimens were extraction tranrectal. Close the rectum stump using purse suture. At last, rectum were reconstructed by circular stapling.

P344 clinicopathological characteristics of patients

	Young <40y n=264	Middle age 41-65y n=3735	Old age >65 n=2774	P value
N0	123(46.6)	2251(60.3)	1803(65)	
N1	75(28.4)	1226(32.8)	835(30.1)	
N2	66(25)	248(6.6)	134(4.8)	0.001
N3	0	10(0.3)	2(0.1)	
M0	212(80.3)	3201(85.7)	2449(88.3)	
M1	52(19.7)	534(14.3)	325(11.7)	0.017
I	47(17.8)	833(22.3)	592(21.3)	
II	68(25.8)	1237(33.1)	1082(39)	
III	97(36.7)	1135(30.4)	800(28.8)	
IV	52(19.7)	530(14.2)	300(10.7)	0.021
WD	34(12.9)	477(12.8)	344(12.4)	
MD	184(69.7)	2986(79.9)	2250(81.1)	
PD	19(7.2)	116(3.1)	82(3)	
Mucinous	24(9.1)	122(3.3)	86(3.1)	0.001
Signet	1(0.4)	3(0.1)	1(0)	
Others	2(0.8)	31(0.8)	11(0.4)	

Results/Outcome(s): The operation time was 110min, and the bleeding amount was 30ml. The interval to first oral intake was 26h, and the postoperative hospitalization length was 8d.

Conclusions/Discussion: 3D laparoscopic resection for low rectal cancer with transrectal specimen extraction surgery is feasible and safe.

THE IMPACT OF RESIDUAL INTESTINAL LENGTH ON ANASTOMOTIC LEAKAGE FOLLOWING DST RECONSTRUCTION IN LAPAROSCOPIC COLORECTAL CANCER SURGERY.

P346

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Purpose/Background: The Double Stapling Technique (DST) using liner as well as circular staplers is one of the major reconstruction methods in rectal cancer surgery. Its principle is simple, however, its leakage rate is higher than that of functional end to end anastomosis because of risk of lower blood supply or higher tension. The tension of anastomosis might be caused by less mobilization or shorter length of the residual intestinal length. In recent years, CT colonography (CTC) is often performed preoperatively as 3D reconstruction teaches accurate location of tumor and feeding artery. Moreover, CTC can measure the length of colon and rectum objectively. In this study, we then estimated the residual intestinal length after DST in colorectal cancer surgery using preoperative CTC and evaluated its impact on anastomotic leakage.

Methods/Interventions: Of 143 patients underwent laparoscopic colorectal cancer surgery with curative intention and DST reconstruction in our hospital from June 2014 to March 2018, 104 patients with an appropriate image analysis as well as preoperative CTC performed were included into this analysis. The intestinal length was measured using commercial software, ZAIOSTATION 2. The residual intestinal value (RIV) was calculated by subtraction the length of the surgically resected intestine from the left-sided large intestine (splenic flexure to the anus) and standardized by the height (m). The subjects were divided into two groups (RIV-H and RIV-L) by their average and the clinicopathological findings and surgical outcomes including AL were compared between them statistically.

Results/Outcome(s): RIV-H group and RIV-L group consist of 50 and 54 patients. The mean of their RIV (\pm SD) were 487 (\pm 65) and 343 (\pm 56), respectively. RIV-H group included more number of the patients with low rectal cancer (26% vs 48%, $p=0.020$). No significant difference between them was observed in other background factors including the maximum tumor diameter

and the distance from the anal margin to the lower edge of the tumor. Incidence of anastomotic leakage was significantly higher in RIV-H group (20% vs 3.7%, $p=0.009$). In addition, there were significantly less patients with mobilization of splenic flexure (2% vs 17%, $p=0.034$) Univariate analysis showed that age, ASA ≥ 2 and RIV-H is correlated with anastomotic leakage, and multivariate analysis adjusted for them demonstrated that RIV-H was an independent risk factor for anastomotic leakage (OR:5.39, 95%CI:1.06-27.4, $p=0.042$).

Conclusions/Discussion: The results of this study revealed that longer residual intestinal length was a risk factor for anastomotic leakage. Although the tension applied to the anastomosis can be reduced in cases of long residual intestine, there is a possibility that blood supply to the anastomosis may cause insufficient. In our hospital, inferior mesenteric artery is ligated at the root due to D3 lymphadenectomy, and therefore long residual intestine might harm the peripheral blood supply around anastomosis. It might be necessary to preserve left colic artery or evaluation of blood supply by ICG in case of long residual intestine. Long residual intestinal length after DST reconstruction in laparoscopic colorectal cancer surgery might be a risk factor for anastomotic leakage.

COMPARISON BETWEEN NEOADJUVANT CHEMOTHERAPY AND UPFRONT SURGERY FOR PATIENTS WITH RESECTABLE AND SYNCHRONOUS COLORECTAL CANCER HEPATIC METASTASES.

P347

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Purpose/Background: Additional chemotherapy to surgical resection for resectable colorectal cancer with liver metastases (CRLM) may improve long term survival and has been widely incorporated in clinical practice. However, whether neoadjuvant chemotherapy (NAC) should be addressed earlier than surgical resection is still a matter of debate, which is lack of randomized prospective study. To our best knowledge, there has been no comparative study between upfront surgery and NAC only in patients with synchronously developed CRLM. We therefore aimed to analyze the treatment outcomes between NAC and upfront surgery in patients with resectable and synchronous CRLM.

Methods/Interventions: Using a prospective colorectal cancer registry, we enrolled 281 consecutive patients who underwent curative resection for resectable, synchronous CRLM from 2006 and 2017. Resectable CRLM was defined as the 1-4 hepatic metastases with lesser than 5cm in the largest diameter. We divided them into 2 groups according to initial treatment: NAC group ($n=94$), and surgery group ($n=187$). A one-to-one propensity score matching

(PSM) analysis was applied. Possible confounders chosen for PSM were based on known risk factor for oncologic outcomes. Perioperative outcome and long term survival were compared.

Results/Outcome(s): In overall cohort, rectal cancer (58.5% vs. 33.7%; $P < 0.001$) and higher proportion of preoperative radiotherapy (26.6% vs. 4.3%; $P < 0.001$) were found in NAC patients. NAC was associated with higher rate of CEA > 200 at diagnosis (11.7% vs. 4.8%; $P = 0.034$), larger hepatic tumor size (2.5cm vs. 2.0cm; $P = 0.034$) and more number of hepatic tumor at diagnosis (2 vs. 1; $P = 0.004$) than surgery group. There was no difference in 5-year overall survival (OS) (73.8% vs. 68.9%; $P = 0.463$) and disease free survival (DFS) (27.4% vs. 36.3%; $P = 0.057$) between two groups. After PSM, 52 NAC and 52 surgery patients showed similar preoperative clinical characteristics. Intraoperative outcomes as well as immediate postoperative outcomes were not different between two groups. 5-year OS (77.0% vs. 67.1%; $P = 0.098$) and DFS (23.4% vs. 25.9%; $P = 0.542$) did not differ significantly.

Conclusions/Discussion: Comparisons of short- and long term outcomes between NAC and upfront surgery were not shown any significant differences. Based on this study, both chemotherapy and surgery are both feasible options as the initial treatment for resectable, synchronous CRLM. A trial comparing these two strategies should be followed.

PSM cohort

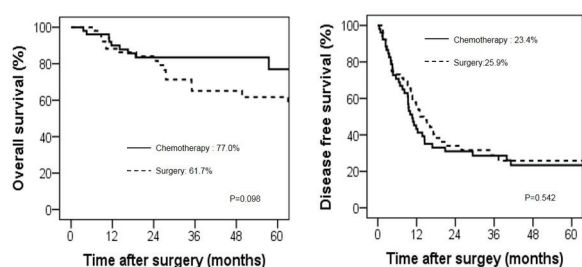


Fig.1. Overall- and disease free survival after propensity score matching

COST-EFFECTIVENESS ANALYSIS OF SCREENING VERSUS PROPHYLACTIC SURGERY FOR MANAGEMENT OF COLORECTAL CANCER RISK IN LYNCH SYNDROME.

P348

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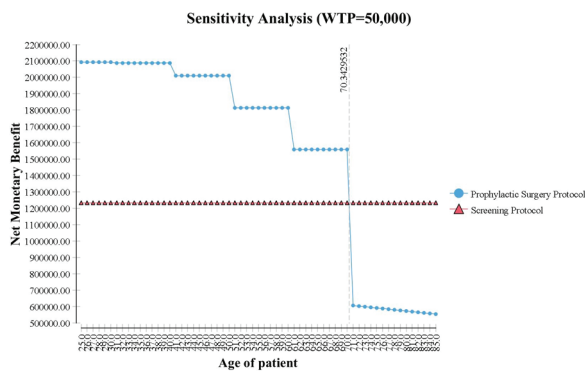
Purpose/Background: Colorectal cancer is the third most-common cancer in the United States and the second leading cause of cancer related deaths. Three to five percent of cases are associated with an identifiable inherited colorectal cancer syndrome, such as Lynch Syndrome. Lynch syndrome related malignancies are associated with a predilection for the proximal colon, improved

disease-related survival, and multiple colorectal cancers. Current management options for Lynch Syndrome in patients with a known genetic mutation but without a diagnosis of colorectal cancer include routine screening and prophylactic colectomy. When comparing these two options, previous studies have shown differences in life-expectancy and quality of life. The aim of this study is to determine whether serial colonoscopy or prophylactic surgery is the more cost-effective method regarding colorectal cancer outcomes.

Methods/Interventions: A Markov decision analysis tree was created to evaluate the cost-effectiveness of serial colonoscopic exams (SC) versus prophylactic colectomy (PS) for Lynch syndrome patients with an initially negative colonoscopy. Health care utilization based on CMS derived costs and utility benefits of SC compared to PS in quality-adjusted life-years (QALY) gained or lost as a function of the treatment strategies were compared. The model was constructed with an annual cycle in patients ages 25 to 85. Patients enter the model at any age in that range, but the model would only continue to follow the patient until age 85. The colonoscopy arm included the option of crossing over to prophylactic surgery, subtotal colectomy with ileorectal anastomosis, if desired. Once a cancer was found, patients could undergo segmental colectomy or subtotal colectomy with ileorectal anastomosis. All patients diagnosed with cancer were transitioned to surveillance protocols appropriate for their cancer diagnosis. The potential for developing metachronous colon cancer varied based on the extent of initial resection. Recurrence and mortality rates varied based on stage. If metastatic disease was present, surgery for cure was included as a potential option. Probabilities for each disease state were obtained from extensive literature review. Where information was not directly available based on Lynch syndrome alone, data regarding colorectal cancers with microsatellite instability was utilized. Probabilities for transition between disease states were varied based on age where appropriate. The primary outcome was net monetary benefit (NMB) of the treatment strategies based on residual cost per QALY. NMB was calculated using a willingness-to-pay of \$50,000 per QALY. A one-way sensitivity analysis with a 10,000 patient microsimulation was used to assess the effect of varying age on the outcomes of the model.

Results/Outcome(s): Analyzing the entire cohort, the mean cost per patient in SP was \$79,258 (SD \$88,110) compared to \$63,998 (SD \$57,800) in PSP. Mean effectiveness in QALY was 18.31 (SD 13.5) and 20.37 (SD 15.63) for SP and PSP, respectively. The mean NMB for SP was \$818,140 (SD \$664,219) compared to PSP with \$929,449 (SD \$777,999). One-way sensitivity analysis across the age spectrum of the cohort showed that PSP had an increased NMB over SP until age 70.3 years (Figure). Patients with age greater than 70.3 years demonstrated decreased NMB for PSP.

Conclusions/Discussion: The decision to proceed with SC or PS in the setting of Lynch syndrome without colorectal cancer is often based on variables such as patient postoperative bowel function, quality of life, risk of metachronous cancer, surgical morbidity and medical comorbidities, which are accounted for in the model. Within the constraints of this decision analytic state transition model, proceeding with PS is associated with greater residual value per preserved life-year for patients under age 70. After age 70, the model shows that SC becomes the optimal approach. Given the results of this analysis, prophylactic surgery under the age of 70 is a cost-effective alternative to screening colonoscopy.



Net monetary benefit was calculated based on a willingness-to-pay of \$50,000 per quality-adjusted life-year. Age was varied from 25 to 85 years as this was the intended extent of the model. The prophylactic surgery protocol has an increased net monetary benefit, meaning that there is more money left over for a given willingness-to-pay, over the screening protocol until age 70.3 years. Therefore, prophylactic surgery would be the more cost-effective approach for patients under the age of 70.

DECODING THE TOTAL PROCTOCOLECTOMY EXPERIENCE IN THE INDIAN SUBCONTINENT: EIGHTY PATIENTS OVER 8 YEARS.

P349

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Purpose/Background: Total proctocolectomy (TPC) is the surgical treatment option for patients who have failed medical management for ulcerative colitis, select patients with Crohn's disease (without evidence of anorectal disease), and patients with synchronous colon cancers. In addition, because of an associated increased risk of colon cancer development, a total proctocolectomy is offered as prophylaxis to patients diagnosed with familial adenomatous polyposis and hereditary non polyposis colon cancer syndromes. The surgical procedure has evolved over the last three decades but there is a paucity of data from developing countries regarding the demographics of the treated population and the challenges and morbidities associated with it.

Methods/Interventions: Herein we present the data on eighty patients who underwent a total proctocolectomy at

Tata Memorial Hospital, Mumbai India from January 2010 to June 2018. We analyse the demographics of the patient population vis a vis that in published literature, the indications of surgical management and complications thereof as well as scrutinize the implications of the histopathological findings in patients who have undergone the procedure

Results/Outcome(s): Mean age was 48.3 years with 62% male and 38 % female patients. Thirty eight percent of individuals had colonoscopy findings s/o a polyposis syndrome without malignant degeneration. Another 50 percent presented with frank adenocarcinoma of the colon/rectum with high risk polyps elsewhere in the colon or a second synchronous colorectal malignancy. Inflammatory bowel disease not responding to conservative management made up the remaining 12percent. While a total of 55 TPCs were open 22 were successfully performed laparoscopically, 2 were converted to open and 1 was robotic. TPC with end ileostoma was most commonly performed at 44% followed by TPC with ileal anal pouch anastomosis (IPAA) at 40%. Completion proctocolectomy and TPC with Ileorectal anastomosis (IRA) made up the rest. Of the 32 patients who underwent an IPAA, 12 were performed laparoscopically. Pouch complications (anastomotic leak and pelvic sepsis; small bowel obstruction, pouchitis) were documented in 5 out of the 32 (16%) patients of IPAA. There was no apparent correlation between incidence of pouch complications and NACTRT received, laparoscopic /open approach or level of anastomosis. Only 6 patients of the total 80 TPC patients (7%) had complications rating IIIb and above on the Clavien Dindo scale with the most common postoperative complication being surgical site infections. Seventy two percent patients had evidence of malignancy in the final histopathology report irrespective of preoperative colonoscopic biopsy.

Conclusions/Discussion: The total proctocolectomy procedure has evolved over the last three decades ever since Parks et al in 1980 demonstrated that an ileal reservoir could be fashioned and anastomosed to the anus through a mucosally denuded rectal cuff of varying lengths, thus avoiding the need of a permanent ileostomy. Laparoscopic approach for this procedure was used for the first time in 1992 TPC effectively eliminates cancers as well as the risk of cancers in patient with polyposis syndromes or ulcerative colitis while maintaining a decent quality of life. However, lack of a screening program or a national registry for polyposis syndromes result in patients presenting late with a significant number already having developed malignancy on presentation. Thus, here in the apex cancer treatment center in the Indian subcontinent, the total proctocolectomy procedure has been more often than not performed in the presence of a frank malignancy with all its attendant risks and the challenges it poses to completing cancer treatment. The study aims at providing a snapshot of effective management of patients in such circumstances with a judicious choice of surgical procedure.

THE IMPACT OF LEARNING CURVE IN ROBOTIC RECTAL CANCER SURGERY ON HISTOPATHOLOGIC OUTCOMES: A SYSTEMATIC REVIEW AND META-ANALYSIS.

P350

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Purpose/Background: Although learning robotic surgery for rectal cancer is associated with prolonged operating time and higher complication rates, its impact on histopathologic outcomes is unknown. The aim of this meta-analysis was to evaluate the impact of the learning curve in robotic surgery for rectal cancer on histopathologic outcomes.

Methods/Interventions: Pubmed, EMBASE, Cochrane Library, MEDLINE via Ovid, CINAHL, and Web of Science were systematically searched. Inclusion criterion was any clinical study comparing outcomes of robotic surgery for rectal cancer between different phases of the learning curve (LC) including competence (C). Primary endpoint was circumferential resection margin (CRM) involvement rate defined as CRM <1 mm. Mantel-Haenszel method with odds ratios with 95% confidence intervals (OR (95%CI)) was used for dichotomous variables. Risk adjusted cumulative sum (RA-CUSUM) analysis was utilized to identify the impact of the learning curve on the primary endpoint.

Results/Outcome(s): Ten studies totaling 907 patients (521 LC and 386 C) were selected. Nine studies were found to have low risk of bias, one study had moderate risk of bias. CRM involvement rate was 2.9% (13/441) in LC vs. 4.6% (13/284) in C. This difference was not significant [OR (95%CI) = 0.70 (0.30, 1.60); p=0.39; I²=0%]. RA-CUSUM showed decreasing trend in CRM involvement rate over time (R²=0.99).

Conclusions/Discussion: Learning curve had no detrimental impact on CRM involvement rates when compared to surgeons' competence in robotic surgery for rectal cancer. A decreasing trend in the risk of CRM involvement was found not only during learning but also during competence.

APPENDICEAL NEOPLASMS AS INCIDENTAL FINDING IN EMERGENCY APPENDECTOMIES PERFORMED IN REGIONAL HOSPITAL OF RANCAGUA, CHILE.

P351

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Purpose/Background: Appendiceal tumors are a rare pathology (0.5% of Gastrointestinal Neoplasms and 1% of Appendectomies), which forms part of an heterogeneous group of neoplasms with uncertain evolution and prognostic. It is important to emphasize that in most cases it is a post-operative finding. If the diagnosis of appendiceal tumors is suspected intraoperatively, it may challenge the course of the surgical intervention and treatment. The purpose of this study is describe the incidence of appendiceal neoplasms in the setting of emergency appendectomies in the Regional Hospital de Rancagua (RRH) during the period 2014-2017.

Methods/Interventions: This article represents a retrospective and observational study. The anatomopathological results of appendectomies performed between the years 2014 – 2017, for suspected acute appendicitis in the emergency room (ER) of HRR were reviewed. Positive biopsies for appendiceal neoplasms were analyzed, excluding those with contiguity involvement or metastasis. Variables included in the analysis: age, sex, preoperative diagnosis, type of surgery, approach, complete tumor resection, re-intervention, surgical biopsy, adjuvant therapy. Description of variables in percentages, means or medium.

Results/Outcome(s): 4000 patients were analyzed. The diagnosis of appendiceal neoplasm was confirmed in 27 patients (0,6%); with 17 Neuroendocrine Tumors (63%) and 10 Epithelial Neoplasms (37%). There was pre-operative suspicion in only one case (3.7%). Average age was 42.1 years (SD ± 22.2), 34.8 years (SD ± 17.9) for Neuroendocrine Tumors and 54.4 years (SD ± 24.3) for Epithelial neoplasms. There was a predominance of

P349 Aetiology and Complications

COMPLICATION	AETIOLOGY	NUMBER
Surgical site infection	FAP:1, Syn Can:2, Polyps with Ca:3	6
Burst abdomen	Syn cancer:1, Polyps with Ca:1	2
Urinary dysfunction	Syn Cancer:3, Polyps with Ca:2	5
Anastomotic leak	Polyps with Ca: 2	2
Sepsis	Polyps with Ca: 1	1
Ileus/small bowel obstruction	FAP:1,Syn Cancer:1	2
Pouchitis	Polyps with Ca: 2	2
Secondary haemorrhage, pancreatic fistula	FAP:1	1

FAP: Familial adenomatous polyposis coli;

Syn Can: Synchronous Cancers;

Polyps with Ca: Polyposis syndrome with malignancy

women in neuroendocrine tumors (71% vs 29%), showing equal prevalence in both sexes for Epithelial Neoplasia. In 2 cases it was required Right Hemicolectomy to complete treatment (Neuroendocrine Tumors).

Conclusions/Discussion: The appendiceal neoplasias in acute appendicitis remain as low incidence and low pre-operative suspicion, so you must have an active response to perform a diagnosis and adequate subsequent treatment.

ULTRASOUND-GUIDED TAILORED LATERAL INTERNAL SPHINCTEROTOMY (UT-LIS) FOR TREATMENT OF CHRONIC ANAL FISSURE.

P352

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Purpose/Background: Effective treatment of chronic anal fissures with long-lasting cure is notoriously challenging. Many patients on conservative treatment, topical application of medical ointments, aiming to reduce the pressure of the anal sphincter, or subjected to *botulinum toxin* injection suffer from recurrence. Lateral internal sphincterotomy is considered the treatment of choice to avoid recurrence, however, the technique bears the risk of lasting changes in faecal continence. This risk increases with the amount of sphincter divided. A tailored sphincterotomy with division of the internal sphincter limited to the length of the fissure as verified by endoanal ultrasound may minimize this risk and still hold acceptable healing rates. The primary aim of this study was to evaluate the healing rate following UT-LIS for chronic anal fissures. Secondary aims were efficacy on fissure-related pain relief, and the risk and degree of faecal incontinence following this procedure.

Methods/Interventions: This was a retrospective cohort study of consecutive patients subjected to UT-LIS at Digestive Disease Center, Bispebjerg Hospital, University of Copenhagen, between 2007 and 2017. All patients had a chronic anal fissure located at the anterior and/or posterior midline with no healing on previous treatments with topical application of ointments, such as diltiazem and glyceryltrinitrat gels, and /or Botox injection. A closed sphincterotomy of the internal sphincter according to the height of the fissure verified by simultaneous endoanal ultrasonography was performed. Patients' faecal continence was assessed prior to and 8 weeks after the procedure. Patients' records were scrutinized October 2018 for any evidence of recurrence of the fissure or continence problems leading to contact with the health care system.

Results/Outcome(s): In total, 148 patients (78 (53%) females) underwent UT-LIS. Median age was 42 years (IQR 36 – 52 years) and follow-up was 64 months (IQR: 44-80 months). The duration of symptoms was median

26 months (IQR: 12-47 months) prior to UT-LIS. In 115 patients (78.2%) the fissure healed and the same number of patients, were free of fissure-related pain following UT-LIS. There were no statistically significant associations between age, gender, BMI, tobacco and alcohol use, or duration of symptoms on the two outcomes fissure healing and pain relief. Eleven patients (7%) reported incontinence for flatus alone following UT-LIS, whereas no patients developed incontinence for fluid or solid stool. Six patients (4%) with flatus incontinence prior to the UT-LIS had complete remission of the incontinence following the sphincterotomy. Re-UT-LIS was performed in 27 patients (18%) median 4 months (IQR 2-10 months) following the initial procedure. Two of the 27 patients (7%) subjected to re-UT-LIS, developed flatus incontinence.

Conclusions/Discussion: Ultrasound-guided tailored lateral internal sphincterotomy for chronic anal fissures, resistant to previous treatment modalities including botox injections, holds acceptable high healing rates with minor risk of flatus incontinence. Due to the potential persistent changes in continence function, we still reserve UT-LIS to patients with no remission on non-surgical intervention.



INTERVAL CT IMAGING DETECTS SMOLDERING DIVERTICULITIS AFTER MEDICAL MANAGEMENT OF INDEX EPISODE.

P353

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Purpose/Background: The natural course of acute diverticulitis during and after an index episode is highly variable and remains difficult to predict even when a variety of factors are taken into consideration. The role and type of medical versus emergent/urgent or elective surgical management remains a current topic of debate. We previously reported a high recurrence and secondary surgery rate in patients treated medically for complicated diverticulitis. Despite this high rate of recurrence, about one third of patients did not experience further problems and may safely avoid elective surgery. The purpose of this study was to determine the utility of interval CT-imaging after a resolved episode of diverticulitis. Our hypothesis was that interval CT scan may define the incidence of persistent pathology, referred to as “smoldering” diverticulitis and could be used to predict future operative needs.

Methods/Interventions: Patients admitted with acute diverticulitis at a tertiary referral hospital from 2016 to 2018 were retrospectively reviewed. Excluded were patients with uncomplicated diverticulitis treated on an outpatient basis. Primary outcomes of interest were the rate of recurrent or “smoldering” diverticulitis on follow up CT imaging, endoscopy, or subjective symptoms, and the rate of subsequent emergent or elective colorectal resection. Smoldering diverticulitis was defined as CT evidence of persistent inflammation, phlegmon, or fluid collections between 6 weeks to 6 months after non-operative management of the index attack. Secondary characteristics included patient demographics, baseline medical history, initial modified Hinchey classification, inpatient management details including radiological or surgical intervention, and subsequent endoscopy and imaging results. Statistical analysis was performed in Microsoft Excel using 2-tailed t-test for continuous variables, and chi-squared or fisher exact test for categorical data.

Results/Outcome(s): Out of 279 patients reviewed, the majority received a follow up colonoscopy within four months. 29 patients required reevaluation with a CT scan. Of these, 66% ($p=0.018$) were found to have evidence of “smoldering” diverticulitis on CT scan. There were no significant differences in the initial presenting Hinchey classifications between the “smoldering” and “non-smoldering” groups, with 58.6% Hinchey Ia, 20.7% Hinchey Ib, and 20.7% Hinchey II, overall. There was a higher percentage of patients in the “non-smoldering” group with normal follow up colonoscopy (5/10 vs 5/19), however this did not reach statistical significance. A total of 31% (9/29 patients) subsequently underwent a sigmoid resection. A higher percentage of patients in the “smoldering” group went on to receive resection, (37% vs 20%) however this

did not show statistical significance. The operative LOS for the “smoldering” group was longer (10d +/- 8.5 vs 2d +/- 1.4) but not statistically significant.

Conclusions/Discussion: The rate of smoldering diverticulitis after an index episode remains unknown but is likely higher than previously reported. Interval CT scan following successful inpatient medical management, when used in conjunction with clinical and endoscopic findings, may allow for identification of those patients who most benefit from an elective interval resection. Larger systematic studies to evaluate the role and benefit of interval CT imaging will be needed in the future.

SYNDROMIC PILONIDAL SINUS CORRELATES WITH PELVIC-GIRDLE ACNE INVERSA.

P354

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Purpose/Background: PURPOSE: We hypothesized that pilonidal sinus, when it forms part of the acne inversa syndrome (AIS), would be associated with the pelvic-girdle region of AIS. **BACKGROUND:** Pilonidal sinus is commonly a standalone condition; when it forms part of AIS, we use the term syndromic pilonidal sinus. AIS affects defined anatomic areas in two non-contiguous regions, one surrounding the shoulder girdle and the other surrounding the pelvic girdle. We tested the clinical observation that syndromic pilonidal sinus correlates with AIS lesions in the pelvic girdle region more strongly than with AIS lesions in the shoulder girdle region.

Methods/Interventions: METHODS: We reviewed 189 consecutive AIS and pilonidal sinus operations, done on 157 patients over a 6-year period. All patients were examined for AIS in 15 anatomic areas, and we uniformly recommended laying-open of all sinuses. We looked at cases involving pilonidal sinus, using logistic regression to determine how syndromic pilonidal sinus correlated with the shoulder-girdle and pelvic-girdle AIS regions.

Results/Outcome(s): RESULTS: 91 patients (58%) had 96 operations (51%) for pilonidal sinus. 62 patients (68%) had solitary pilonidal sinus, and 29 patients (32%) had syndromic pilonidal sinus. Solitary and syndromic groups were similar demographically. Syndromic pilonidal sinus correlated positively with pelvic-girdle AIS (OR=6.61, $p<0.001$) and negatively with shoulder-girdle AIS (OR=0.35, $p=0.004$).

Conclusions/Discussion: CONCLUSIONS: AIS can be divided into two non-contiguous regions, and syndromic pilonidal sinus tends to form part of the pelvic-girdle region, rather than the shoulder-girdle region. These data suggest that we examine more fully patients who present with pilonidal sinus, and they also suggest where to look for additional AIS lesions.

RECTAL ADVANCEMENT FLAP (RAF) AND INTERPOSITIONAL BIOLOGICAL MESH AS THE METHOD OF CHOICE FOR LOW RECTOVAGINAL FISTULAS.

P355

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Purpose/Background: Rectovaginal fistula (RVF) generally causes severe debilitation to patients' quality of life. RVFs most commonly occur as a result of obstetric trauma (85%) and pelvic surgery (5%). Inflammatory bowel disease (IBD), radiation, and malignancy encompass the majority of the remaining causes. Historically, the recommendation has been to perform a less invasive procedure first and then attempt the more complex procedures if the intervention failed. However, more recent data indicates that an initial complex repair has shown better outcomes and lower recurrence rates than the step-up approach. While the paucity of data is largely due to relative low incidence of this pathology and the complex anatomical differences between patients, RVFs remain one of the most challenging conditions for colorectal surgeons. The aim of our study was to compare the success rate of rectal advancement flap (RAF) with interpositional biological mesh and RAF repair alone in patients with low RVFs.

Methods/Interventions: This is a retrospective case-control study of patients who underwent repair of rectovaginal fistula between January 2011 and December 2017. The mesh group (control) was selected among patients who underwent RAF with interpositional biological mesh placement. Patients who underwent RAF alone were placed in the non-mesh group (cases). Retrospective chart review included demographics, operative approach, mesh type and post-operative outcomes. Inclusion criteria consisted of the presence of low lying, small (<1cm) simple RVF. Exclusion criteria included any presence of malignancy, previous radiation treatment, or inflammatory bowel disease (IBD). All patients underwent surgical intervention at a single, tertiary care hospital.

Results/Outcome(s): Out of seven patients with RVFs in the mesh group, six had no previous repairs and one was a recurrent RVF following a repair at an outside institution. Three RVFs occurred following an obstetric trauma and four were cryptogenic in origin. Mean patient age was 43.4±15.8 years and a mean body mass index (BMI) was 25.7±6.2 kg/m². All repairs were performed transanally using RAF with a biological mesh overlying the primarily closed anorectal internal opening. Six patients had a bovine mesh placed and one patient had a porcine mesh. None of the patients underwent proximal fecal diversion before the repair. Three patients had anterior levatoroplasty performed during the repair. The mean operative time was 80.6±17.4 minutes and the mean length of stay was 1.1±0.4 days. The mean length of follow up was 12.6±8.6

months. The only observed thirty-day post-operative complication was a *Clostridium difficile* infection in one patient. One patient had a recurrence at 4 months at the site of repair. The non-mesh group consisted of 13 patients who underwent RAF alone. Six RVFs occurred following obstetric trauma, four were cryptogenic in nature, two occurred as a post-hemorrhoidectomy complication and one secondary to a low anastomotic leak. Mean patient age was 43.5±9.6 years and a BMI was 30.2±6.8 kg/m². Eight out of thirteen patients underwent proximal fecal diversion. The mean operative time was 133±57 minutes and mean length of stay was 1.2±0.6 days. There were two within 30 days complications including *Clostridium difficile* infection and peri-incisional abscess. Four out of thirteen patients had a recurrence. The mean time to recurrence was 3.75±2.06 months. The mean length of follow up was 6.3±4.8 months. The risk of developing a recurrence was lower in the mesh group than in the non-mesh repair group (OR, 0.37; 95% CI, 0.03-4.23; *p*=0.40).

Conclusions/Discussion: Rectovaginal fistula repair with biological interpositional mesh appears to provide an effective surgical option that can be safely performed transanally with minimal post-operative complications, low recurrence rates and without a proximal fecal diversion. Further studies including prospective randomized control trials would be beneficial to further elucidate the benefits of this technique.

SELECTIVE VERSUS 6-COLUMN MUCOPEXY IN TRANSANAL HEMORRHOIDAL DEARTERIALIZATION: IS LESS MORE?

P356

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Purpose/Background: Hemorrhoids are one of the most common benign anorectal disorders in the US, affecting up to 25% of the population. For Grade 3 and 4 hemorrhoids, the open hemorrhoidectomy has historically been accepted as the gold standard surgical treatment. While effective, this procedure is well known for significant post-operative morbidity. As an alternative to this approach, and in an attempt to decrease its post operative morbidity, the transanal hemorrhoidal dearterialization (THD) was created in 1995 by Morinaga et al with the addition of a mucopexy in 2002 by Dal Monte et al. The current procedure includes Doppler-guided arterial ligation at 6-column locations, followed by 6-column mucopexy to reduce prolapsed tissue. It has been recognized, however, that most patients presenting with hemorrhoidal disease suffer from isolated tissue prolapse, and as a result do not necessarily need the described 6-column mucopexy. Therefore, some providers have begun to perform the 6-column Doppler guided arterial ligation with selective mucopexy for tissue prolapse

reduction. The purpose of this work is to examine the operative time, recurrence and stricture rates between 6-column Doppler-guided arterial ligation with performance of selective column mucopexy or 6-column mucopexy by a single provider.

Methods/Interventions: A single surgeon's database was reviewed from 2012 and 2017. All patients with at least 18 months of follow up were included in analysis. A complete 6-column mucopexy was performed from March 2012 to January 2015, at which point a selective (2 to 3-column pexy) was performed until the end of data collection in April 2017. The degree of intraoperative tissue prolapse determined whether a 2 or 3 column mucopexy was performed per the surgeon's discretion. Recurrence was defined as emergence or persistence of hemorrhoidal symptoms that required operative re-intervention.

Results/Outcome(s): 54 cases were identified with 6-column mucopexies and 47 cases were identified with selective-column mucopexies. There was no significant difference in age or ASA between the two groups ($p=0.58$ and 0.10 , respectively). There was a significant difference in operative time between the two groups ($p=0.014$), with selective-column mucopexy taking an average 44 ± 10 minutes whereas the 6-column mucopexy taking 50 ± 12 minutes. There was no increase in recurrence at 18 months of follow up between the two groups ($p=0.94$), with 10 of the 54 all-column mucopexies and 9 of the 47 selective-column mucopexies experiencing recurrence. There was 1 report of stricture in the 6-column mucopexy group, with no strictures occurring in the selective mucopexy group.

Conclusions/Discussion: Selective-column mucopexy is a viable and potentially superior alternative to the 6-column mucopexy when performing THD in regards to operative time without compromising recurrence or increasing stricture rates.

DOES CESSATION OF THE PREOPERATIVE ANTIBIOTIC PROPHYLAXIS IN LOOP ILEOSTOMY CLOSURE REDUCE POSTOPERATIVE READMISSIONS FOR C. DIFFICILE INFECTION?

P357

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Purpose/Background: C. difficile infection (CDI) has been deemed a major public health issue, with an incidence estimated at nearly 500,000 cases annually. Many medications have been implicated as risk factors for development of CDI, including antibiotics, steroids, and proton pump inhibitors. Exposure to as little as one perioperative dose of antibiotics has been associated with the development of CDI. The aim of this study was to evaluate

whether the incidence of readmission for CDI was lower among a cohort of patients who did not receive preoperative antibiotics prior to closure of diverting loop ileostomy, compared with a cohort of patients who did receive preoperative antibiotic prophylaxis.

Methods/Interventions: Using an institutional database, all diverting loop ileostomy closures were identified from January 2010 to July 2018. From January 2010 to December 2011, preoperative antibiotics were utilized, and the wounds closed according to the surgeon's preference ("pre" cohort). Beginning in January 2012, in an attempt to reduce development of CDI within our institution, members of our Division of Colon and Rectal Surgery determined that preoperative antibiotics were not indicated in patients undergoing diverting loop ileostomies with wounds that were left open postoperatively. Therefore, from January 2012 until present, all diverting loop ileostomy reversals were performed without preoperative antibiotics; wounds were left open and packed ("post" cohort). Patient demographics and readmission data were collected and compared between cohorts. The primary study outcome was readmission for CDI within 30 days of surgery.

Results/Outcome(s): A total of 478 patients met inclusion criteria, from January 2010 to July 2018. Of these, 121 (25.3%) underwent stoma closure prior to the decision to withhold preoperative antibiotics. Between the two cohorts, the mean age was not significantly different (49.4 years among pre cohort vs. 51.0 years among post cohort, $p=0.361$). There were also no significant differences in sex (47.1% male vs. 42.3% male, $p=0.356$). A significantly higher proportion of patients in the post cohort (47.3%) had higher American Society of Anesthesiology physical status classification of 3 or 4 (versus 1 or 2), compared to those in the pre cohort (27.3%, $p<0.001$). After surgery, a total of 59 patients were readmitted within 30 days, including 18 (14.9%) in the pre cohort and 41 (11.5%) in the post cohort ($p=0.327$). C. difficile testing was performed during the readmission of 5 patients (27.8%) in the pre cohort and in 22 (53.7%) patients in the post cohort. No patients who were readmitted in the pre cohort tested positive for C. difficile infection within 30 days following surgery, whereas 3 patients in the post cohort tested positive during readmission (Table 1).

Conclusions/Discussion: Among this at-risk cohort of patients, it does not appear that withholding preoperative antibiotic therapy was associated with a lower rate of readmission for C. difficile infection. However, these results may be confounded by a background increase in the incidence of CDI, as well as the increased rate of CDI testing observed among the "post" cohort. Further investigation is warranted to determine whether this practice is associated with a reduction in in-hospital CDI, or a reduction in CDI occurrences treated in an ambulatory setting.

INTRACORPOREAL VERSUS EXTRACORPOREAL ANASTOMOSIS FOR ROBOTIC LEFT HEMICOLECTOMY: A COMPARISON OF OUTCOMES.

P358

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Purpose/Background: When performing colonic resections in minimally invasive surgery, a surgeon has the option of making the anastomosis in an intracorporeal or extracorporeal fashion. A laparoscopic intracorporeal anastomosis for right hemicolectomies has been demonstrated to be superior to that of an extracorporeal anastomosis in terms of fewer post operative complications, shorter hospital length of stay, less post-operative pain, faster return of flatus and improved cosmesis. Similar outcomes have also been demonstrated with use of the robotic platform comparing intracorporeal to extracorporeal anastomosis during right hemicolectomies. Despite these promising findings, no work to date has demonstrated the efficacy of an intracorporeal anastomosis versus an extracorporeal anastomosis in robotic left hemicolectomies. Therefore, the purpose of this work is to examine the outcomes of intracorporeal versus extracorporeal anastomosis in robotic left hemicolectomies.

Methods/Interventions: A single provider’s robotic colorectal database was reviewed. Robotic left hemicolectomies for benign disease were included for analysis. 13 cases using an intracorporeal technique and 54 cases using an extracorporeal technique were included. The intracorporeal left hemicolectomy technique involved intracorporeally resecting the diseased segment, placing an EEA anvil into the proximal colon, and performing a colorectal anastomosis. The standard extracorporeal technique involved extracorporealizing the transected left colon, placing an EEA anvil into the proximal colon, and reentering the abdomen in a minimally invasive fashion to complete the colorectal anastomosis.

Results/Outcome(s): The operative time for an intracorporeal anastomosis was significantly less than for extracorporeal anastomosis (185.7 ± 51.6 minutes versus 232.9 ± 65.1 minutes, respectively) (p=0.018). Hospital length-of-stay for intracorporeal (3.2 ± 1 days) versus extracorporeal (5.2 ± 4.1 days) anastomosis trended towards significance, but did not achieve it (p=0.11). There was no

significant difference in leak, sepsis, wound, readmission or reoperation rate.

Conclusions/Discussion: This preliminary work demonstrates that performing an intracorporeal anastomosis for robotic left hemicolectomy results in significantly decreased operative time, with a trend towards decreased hospital length-of-stay, when compared to performing an extracorporeal anastomosis. While these results are promising, further study with larger patient populations is required.

CLINICAL OUTCOMES OF ILEOSTOMY CLOSURE ACCORDING TO TIMING DURING ADJUVANT CHEMOTHERAPY AFTER RECTAL CANCER SURGERY.

P359

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Purpose/Background: No guidelines exist for when to implement a temporary ileostomy closure during adjuvant chemotherapy following sphincter-saving surgery for rectal cancer. The aim of this study was to evaluate the clinical and oncological outcomes of ileostomy closure during adjuvant chemotherapy after curative resection of rectal cancer.

Methods/Interventions: This retrospective study investigated 288 patients with rectal cancer undergoing sphincter-saving surgery with protective ileostomy from January 2007 to August 2016. Patients were divided into three groups: Group 1 (n = 68) did not undergo chemotherapy and experienced closed ileostomy within 90 days of initial cancer surgery. Group 2 (n = 161) underwent closure during adjuvant chemotherapy. Group 3 (n = 59) underwent closure after adjuvant chemotherapy.

Results/Outcome(s): No significant differences among the three groups were seen in operative time, estimated blood loss, interval for resuming diet, or postoperative hospital stay. Few postoperative surgical complications were seen for all three groups, without any notable differences among them. No difference in overall survival (p = 0.959) or disease-free survival (p = 0.114) was observed between Groups 2 and 3.

Conclusions/Discussion: Ileostomy closure during adjuvant chemotherapy was clinically safe as an operation. Delay of chemotherapy due to ileostomy closure did not

P357 Readmitted Patients and C. difficile Testing Between Pre and Post Cohorts

	Pre Cohort (n=18)	Post Cohort (n=41)	p-value
C. diff Testing			
Not Done	13	19	
Negative	5	19	
Positive	0	3	0.141

change oncologic outcomes. A well-planned prospective study would be worthwhile to study how early stoma closure during chemotherapy positively affects patient quality of life.

OUTCOMES IN FISTULA TREATMENT USING LIGATION OF INTERSPHINCTERIC FISTULA TRACT AND BIOLOGIC EXTRACELLULAR MATRIX.

P360

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Purpose/Background: A wide variety of surgical procedures are used for fistula management and are tailored to each patient pending the nature of the fistula and associated comorbidities contributing to the disease process. The LIFT procedure is a novel approach to treatment of intersphincteric fistulas with a reported high healing rate, and minimal associated complications.² Our institution has modified this procedure with the insertion of a biologic extracellular matrix within the intersphincteric space after ligation of the fistulous track. We used a porcine urinary bladder matrix graft which has been shown on histology of abdominal hernia repairs to remodel and take on architectural features closely resembling host tissue/fascia.¹ In addition, we analyzed the effect of associated comorbidities on rates of healing.

Methods/Interventions: This was a single institutional review performed at Greater Baltimore Medical Center in Maryland. Data was collected prospectively from January 2014 to February 2018. All patients had a transsphincteric fistula and underwent a LIFT procedure by a Colorectal surgeon. Intraoperative LIFT procedures varied from graft placement, to the application of ACell powder, or no graft/powder insertion. Patient were followed up in clinic. Data collection included demographics such as age, sex, BMI, comorbidities, and immunosuppression. Additional information was recorded including previous anorectal procedures, location of fistula, follow up duration, recurrence, time to recurrence, altered bowel habits, and reoperation.

Results/Outcome(s): A total of 46 patients underwent a LIFT procedure by a Colorectal surgeon. 35 patients had a porcine urinary bladder matrix graft inserted during the operation. 14 patients had transsphincteric fistulas too shallow for graft insertion, and therefore 8 patients had ACell powder inserted, and 6 patients had no graft or powder inserted. Postoperatively, patients underwent a physical exam in clinic to assess healing, and complications including recurrence of fistula were documented. Patient on average had 2.8 post op visits and were followed on average of 74.6 days from surgery. The average age was 39.7 years old, 28 men and 18 females underwent a LIFT procedure. 3 patients had a documented history of Crohn's disease, and 3 patients were on immunosuppression.

16 patients had previous anorectal procedures: 1 LIFT procedure, 2 rectal advancement flaps, 1 fibrin plug with fistulotomy, 1 fibrin plug, 4 fistulotomies, and 1 hemorrhoidectomy. 8 out of 46 patients, or 17.4% of patients had a recurrent fistula after a LIFT procedure. Recurrence time varied from 50 days to 300 days after surgery, with an average of 95.9 days from surgery. 7 out of 8 patients had repeat surgery: 4 LIFT procedures, 1 fistulotomy, 1 rectal advancement flap, and 1 seton placement. Of those patients who had a recurrence, all patients had a fissure located in the anterior position. 1 patient had no graft or powder inserted during the LIFT procedure, 2 patients had Acell powder applied, and 5 patients had a graft inserted. 3 of the 8 patients had significant preoperative comorbidities including one patient with a prior rectal advancement flap, one patient that had 4 previous anorectal procedures, and one patient with Crohn's disease and was on budesonide.

Conclusions/Discussion: 17.4% of patients in this study had a recurrence of their fistula after a LIFT procedure. Of the 8 patients who had recurrent disease, 2 patients had prior anorectal procedures, 1 patient had no graft or ACell powder, and 1 patient had Crohn's disease and was on steroids. Time to recurrence was on average 95.9 days from surgery. Sileri et al reported a healing rate of 73%, with recurrence presenting 4 to 8 weeks postoperatively which required further surgical management.² Porcine urinary bladder matrix grafts present a unique ability to remodel and take on architectural features closely resembling host tissue. Graft insertion during a LIFT procedure may result in excellent healing, as our reported healing rate was 82.6%. Some limitations to this study included the fact that this was a single institutional review, and there was non-randomized selection of patients to graft insertion versus no graft insertion. **Citations:** 1. K.C. Sasse, J.H. Lambin, J. Gevorkian, C. Elliott, R. Afshar, A. Gardner, A. Mehta, R. Lamblin, L. Peraza. Long-term clinical, radiological, and histological follow-up after complex ventral incisional hernia repair using urinary bladder matrix graft reinforcement: a retrospective cohort study. *Hernia*. 2018 Dec;22(6):899-907. 2. Sileri P, Giarratano G, Franceschilli L, Limura E, Perrone F, Stazi A, Toscana C, Gaspari AL. Ligation of the intersphincteric fistula tract (LIFT): a minimally invasive procedure for complex anal fistula: two-year results of a prospective multicentric study. *Surg Innov*. 2014Oct;21(5):476-80.

RESULTS FROM THE PHASE I TRIAL OF AUTOLOGOUS MESENCHYMAL STEM CELLS DELIVERED ON A FISTULA PLUG FOR CROHN'S RECTOVAGINAL FISTULIZING DISEASE.

P361

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Purpose/Background: Crohn's rectovaginal fistulizing disease, affecting 10% of women with Crohn's disease, remains notoriously difficult to treat. We developed a novel protocol of mesenchymal stem cells (MSCs) impregnated on a Gore-A fistula plug for the treatment of refractory rectovaginal fistulizing Crohn's disease. We herein conducted a phase I study to primarily evaluate safety and feasibility, and secondarily, efficacy, of this novel treatment approach.

Methods/Interventions: Following institution board review approval, adult diverted non pregnant, non lactating women without a history of malignancy, with medically and surgically refractory rectovaginal Crohn's fistulizing disease were offered study enrollment. Autologous adipose derived mesenchymal stem cells were harvested during an exam under anesthesia (EUA) with seton placement and concurrent abdominal subcutaneous fat pad biopsy through a 2 cm abdominal wall incision. The subcutaneous

adipose tissue was transported directly to the Human Cell Therapy Laboratory for culture, expansion and adherence to the Gore-A fistula plug. Six weeks following MSC harvest and seton placement, patients returned to the operating room for seton removal, curettage of the tract, and placement of the MSC impregnated plug. Patients were followed for a total of four visits up to the 3 month primary endpoint of safety and feasibility, and secondary endpoint of composite clinical (cessation or improvement in drainage) and radiographic healing (no fluid collection >2 cm in any dimension on pelvic magnetic resonance imaging (MRI)). Clinical assessment and exams were performed at postoperative day one, two weeks, 2 months and 3 months. Pelvic MRI were obtained at the 2 week and 2 month postoperative visits.

Results/Outcome(s): A total of 5 female patients (median age 49 years, 38-53 years) with a median disease duration of 23 years (range, 7-34 years), all on biologic or combination medical therapy with biologic and immunomodulator (n=3) were enrolled in the phase I study following informed consent. **(Table)** Autologous subcutaneous adipose tissue was successfully harvested, and associated MSCs were successfully cultured, expanded and impregnated onto a Gore-A Fistula Plug in all patient. At the time of EUA and plug placement, the plug was trimmed to fit the diameter and length of the fistula tract. There were no serious adverse events or adverse events related to the MSCs or plug during the three month follow

P361 Summary of Phase I Clinical Trial

Study ID	Age	Crohn's disease duration	Current medical therapy	Previous surgical therapy	Drainage at 2 months	MRI at 2 months	Drainage at 3 months	Adverse events	Serious adverse events
1	52	34	ADA	Colostomy	none	No fluid collection	none	none	none
2	53	7	ADA+AZA	Ileostomy, rectal advancement flap, plug	none	No fluid collection	none	none	none
3	41	32	Vedo	Colostomy	none	No fluid collection	none	none	none
4	49	23	Vedo+AZA	Ileostomy, bioLIFT, plug	>50% reduction	No fluid collection	>50% reduction	none	none
5	38	16	Ustekinumab +6-MP	Ileostomy, gracilis flap	unchanged	No fluid collection	unchanged	none	none

ADA = adalimumab

AZA = azathioprine

Vedo = vedolizumab

6-MP = 6-mercaptopurine

up. At three months, 3 patients had complete cessation of drainage, 1 had >50% reduction in drainage, and one had no improvement in clinical symptoms; none had a fluid collection >2 cm in any of three dimensions on pelvic MRI at two months.

Conclusions/Discussion: Autologous mesenchymal stem cells on a novel scaffold delivery device offer a safe and feasible means of delivering a cell-based therapy for rectovaginal Crohn's disease. 80% of patients had symptom improvement with decreased or cessation of drainage per vagina by three months and no evidence of radiographic sepsis. Future six month and one year data will provide more information regarding sustained healing and recurrence of symptoms following restoration of intestinal continuity.

A SINGLE-CENTER EXPERIENCE OF TRANSANAL ILEAL POUCH-ANAL ANASTOMOSIS FOR INFLAMMATORY BOWEL DISEASE.

P362

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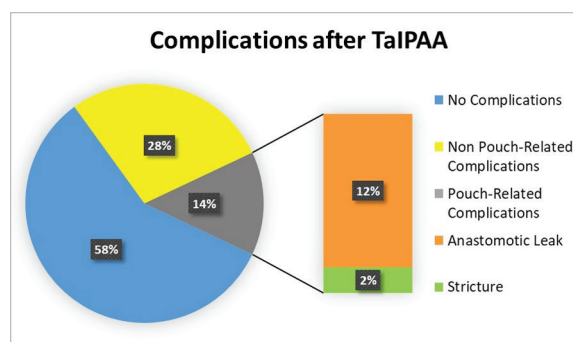
Purpose/Background: Restorative proctocolectomy with ileal pouch-anal anastomosis (IPAA) is the standard operative approach for ulcerative colitis (UC) or inflammatory bowel disease unclassified (IBDU) patients requiring surgery for medically refractory disease or dysplasia and may be performed selectively in highly motivated patients with Crohn's disease (CD). Transanal proctectomy, initially developed for rectal cancer, is gaining momentum as a viable, minimally invasive approach with the potential for improved outcomes over transabdominal proctectomy. This approach has recently been extended to IPAA surgery, with initial reports of transanal IPAA (TaIPAA) suggesting safety and feasibility. Here, we report the largest single center experience of TaIPAA.

Methods/Interventions: Consecutive patients with UC, IBDU or CD undergoing TaIPAA between November 2016 and November 2018 were identified from a prospective registry database at a single inflammatory bowel disease referral center. All surgeries were done by two board-certified colorectal surgeons using a two-team approach with single-port laparoscopy through the ileostomy site for the abdominal dissection. Demographic data, disease characteristics, operative details, and outcomes were measured. 30-day complications (classified according to the Clavien-Dindo system) and any other pouch-related complications occurring between TaIPAA and diverting ileostomy closure were recorded. An anastomotic leak was defined as an abscess adjacent to the pouch or contrast extravasation on computed tomography (CT) or contrast enema.

Results/Outcome(s): The cohort included 50 patients undergoing TaIPAA with mean (SD) age of 38 (15)

years of whom 27 (54%) were male. Mean BMI was 22.9 (3.6) kg/m². 44 (88%) patients had UC, 3 (6%) IBDU, and 3 (6%) CD. 39 (78%) patients received preoperative biologic therapy and 3 (6%) received steroids within 2 weeks of surgery. 42 (84%) patients underwent a 3-stage IPAA, of which 31 (62%) had a prior laparoscopic, 1 (2%) open, and 10 (20%) hand-assisted subtotal colectomy. Mean time from subtotal colectomy to TaIPAA was 4.0 (2.5) months. Pouch-anal anastomosis was performed using stapled double purse string technique (n=14, 28%) or hand-sewn to the rectal cuff (n=8, 16%) or dentate line after mucosectomy (n=28, 56%) depending on pouch reach and other patient factors. Although 4 (8%) cases were converted to open via Pfannenstiel incision due to abdominal scarring or to assess pouch reach, no conversions occurred due to transanal dissection difficulty or complication. Mean operative time was 259 (42) minutes, estimated operative blood loss was 146 (192) mL, and length of hospital stay was 4 (2.3) days. 21 (42%) patients had a 30-day complication of which 7 (14%) patients had a pouch-related complication. 15 (30%) patients required hospital readmission. There were 2 (4%) patients with dehydration, 10 (20%) with ileus/small bowel obstruction, 1 (2%) with urinary tract infection, 1 (2%) with perianal abscess without fistula, 6 (12%) with anastomotic leak, and 1 (2%) with non-leak anastomotic stricture. Of these complications, 7 (14%) were Clavien-Dindo classification 3 and higher. Management of pouch-related complications included 2 patients requiring CT-guided drainage and 2 patients requiring a return to the operating room for stricture dilation. There were no intraoperative complications or deaths.

Conclusions/Discussion: In this largest to date single-center case series, TaIPAA appears technically safe and feasible in experienced hands with acceptable short-term outcomes. Long-term functional outcomes are being gathered to assess effects on gastrointestinal, sexual and urinary function. With growing experience and larger data-sets, comparative studies against traditional transabdominal IPAA will provide further insight on outcomes of TaIPAA.



A NEW AND EMERGING THERAPY FOR THE TREATMENT OF ULCERATIVE COLITIS: SACRAL NERVE STIMULATION.

P363

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Purpose/Background: Ulcerative colitis (UC) is characterized by chronic relapsing intestinal inflammation. It has been a worldwide healthcare problem with an increasing incidence. Recently, there have been some animal studies and clinical case studies showing that sacral nerve stimulation (SNS) has therapeutic potential for intestinal inflammation. The aim of our study was to explore the anti-inflammatory effects and mechanism of SNS treatment of UC.

Methods/Interventions: In this study, we treated the UC with non-surgical SNS using electroacupuncture (EA). We performed EA on 15 patients (Female: Male=4:11; Age: 39.4 ±13.71) with moderate and severe UC of non-malignant origin that is either refractory or intolerant to the drug therapy. The 4 needles will be inserted bilaterally to a depth of 80-90 mm with an angle of 30° inward and downward into the sacral foramina S2 and S3. Needle placement is confirmed by applying the pulses at the amplitude of 5 mA. After the insertion of 4 acupuncture needles, the SNS therapy was delivered for 1 hour in a bipolar configuration with 2 needles on the left side stimulated using the first bipolar electroacupuncture stimulator (SNM-FDC01, Medipace Inc) and 2 needles on the right side stimulated using the second bipolar stimulator, pulse width of 500 μsec, and frequency of 5 Hz for a brief period (5-10 sec). When the patient has a sense of radiation in the perineal area, the acupuncture position is correct. Once the needle placement is confirmed, the evaluation of the sensitivity threshold is performed and the active-SNS therapy is delivered at 90% of the sensitivity threshold and 10% duty cycle (10 sec ON and 90 sec OFF). We repeated the procedure daily for 2 weeks. We collected the data during 3 types of assessments made before the SNS therapy and at the end of 2-week SNS therapy period (1. symptom assessments for calculation of the Mayo score; 2. blood test and fecal test for the assessment of inflammatory index; 3. ECG for the assessment of autonomic function). The autonomic function was assessed by the spectral analysis of heart rate variability (HRV) derived from the ECG.

Results/Outcome(s): 1) The study found that patients with UC had improved symptoms after treatment. The Mayo score significantly decreased after 2 weeks (6.47 ±2.00 vs 4.33 ± 1.72 p<0.001). 2) At the same time, patients' fecal calprotectin (138.97 ±45.30 vs 87.67 ± 49.97 p=0.001), C-reactive protein (14.95 ±18.81 vs 5.74 ± 6.11 p=0.033) and erythrocyte sedimentation rate (16.93 ±11.25 vs 11.40 ± 8.95 p=0.047) reduced compared with pretherapy. 3) Acute SNS increased vagal

activity (0.50 ± 0.03 vs 0.51 ± 0.03 p=0.044) and reduced sympathetic activity (0.51 ± 0.02 vs 0.49 ± 0.03 p=0.01). At the same time, long-term SNS also increased vagal activity (0.50 ± 0.03 vs 0.53 ± 0.04 p=0.021) and reduced sympathetic activity (0.51 ± 0.02 vs 0.47 ± 0.04 p=0.004).

Conclusions/Discussion: In conclusion, our results provide an assessment for the efficacy and potential mechanism of electroacupuncture-based SNS therapy in the treatment of moderate and severe ulcerative colitis. It possibly mediates through autonomic and immune cytokine mechanisms. This paves the way for new treatment options for patients with ulcerative colitis who are difficult to treat or tolerate medical treatment. And compared with implantable SNS stimulation, electroacupuncture SNS is cheaper and easier to install.

A COST AND OUTCOMES ANALYSIS OF COLORECTAL SURGERY PATIENTS POST-IMPLEMENTATION OF ENHANCED RECOVERY AFTER SURGERY (ERAS) PROTOCOL AT AN ACADEMIC MEDICAL CENTER.

P364

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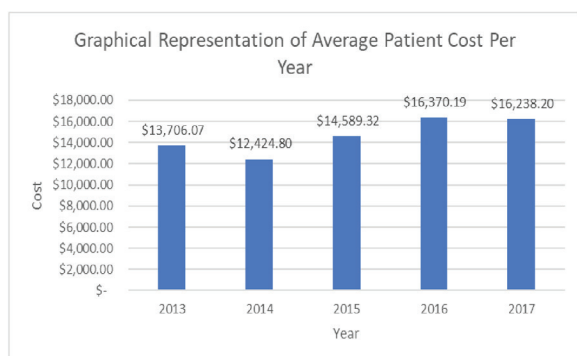
Purpose/Background: The enhanced recovery after surgery (ERAS) protocol was developed to improve outcomes after Colorectal Surgery, which include length of stay (LOS), rates of infection, morbidity, readmission and cost of care. In order to determine the value of a protocol, an objective assessment and comparison of patient outcomes before and after its implementation is critical. We determined the impact of the ERAS protocol on key patient outcomes, specifically LOS, total cost, and perioperative complication rates.

Methods/Interventions: We retrospectively reviewed and analyzed patients who underwent colorectal surgery at a single academic institution between January 2011 and January 2017. Pre-ERAS from 2011 to 2013 was extracted by ICD 9 procedure codes; post-ERAS data from 2014 to 2017 and was identified when the ERAS protocol was initiated. Patient demographic and perioperative data was manually collected from the medical record for 1121 patients. A total of 983 patients, 124 pre-ERAS and 849 post-ERAS, were included in statistical analysis. We excluded acute care surgery (ACS) procedures and records with incomplete financial data. Statistical analysis of demographic, LOS, and cost data was performed using t-tests. Equality of variances were calculated where appropriate using QI Macros. Statistical analysis for complication data was performed by using QI Macros to compare proportions of independent samples. Graph 1 was created by determining the mean LOS and costs for each year.

Results/Outcome(s): Of 983 patients (124 pre-ERAS, 849 post-ERAS), 525 were women (58 pre-ERAS, 467

post-ERAS) and 648 were men (66 pre-ERAS, 582 post-ERAS) with a median age of 61 for both. The pre-ERAS and post-ERAS groups were not statistically different in baseline pre-operative demographic data, which included race, BMI, COPD, pre-admission creatinine, except for higher number of “never-smokers” in the pre-ERAS group (71 of 124, 57%) compared to the post-ERAS group (390 of 849, 46%) ($p=0.03$). A statistically significant increase in average total cost following implementation of ERAS was identified (\$12,389.96 pre-ERAS, \$14,903.43 post-ERAS, $p=0.0005$). A statistically significant increase in 30-day mortality was also identified, with no patients pre-ERAS and 4 patients post-ERAS ($p=0.05$). The average LOS in the pre-ERAS group was 4.7 days, and the average LOS in the post-ERAS group was 5.4 days, which was not statistically significant ($p=0.06$). The trend and graphical representation of average patient cost per year is illustrated in **Graph 1**. All other perioperative variables were not statistically significant.

Conclusions/Discussion: Our results indicate that LOS and cost of care did not decrease following the implementation of the ERAS protocol, and the average cost of care post-ERAS implementation is statistically significantly higher. Both LOS (5.4 days) and total costs (\$14,903.43) were greater in the post-ERAS colon surgery population, even after removing the ACS patients from the analysis. Additionally, the trends in the data demonstrate a performance degradation overtime. This study suggests that the ERAS protocol is not a solution in itself to decrease cost of care and length of stay in patients undergoing elective colorectal surgery.



Graph 1 Average Total Costs for Colon Patients Excluding ACS Cases

THE IMPACT OF AN ENHANCED RECOVERY PROGRAM ON LOOP ILEOSTOMY CLOSURE.

P365

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Purpose/Background: The implementation of enhanced recovery protocols (ERAS) has led to decrease length of stay and complications in colorectal procedures. However, there is little data published on the subset of

patients undergoing loop ileostomy closure. We aimed to investigate the outcomes of loop ileostomy reversals prior to and after initiation of ERAS protocol.

Methods/Interventions: In a retrospective, case-control approach to compare patients prior to and after implementation of a standardized ERAS protocol, patients were identified who underwent ileostomy reversal over a 5 year (January 2012 to September 2018) span by 4 colorectal surgeons. Patient demographics, length of stay (LOS), underlying disease process, previous intra-abdominal procedure, and readmission rate, and complications were evaluated.

Results/Outcome(s): 278 patients were initially evaluated and 205 were finally analyzed. Patients who did not have a local resection or underwent a concurrent intra-abdominal procedure were excluded. Of the 205 patients, 149 were pre-ERAS and 56 underwent surgery after initiation of ERAS. Age, sex, race, and BMI were not significantly different in each group. The LOS was significantly lower in the ERAS group compared to the pre-ERAS group (91.2 hours vs. 128.5 hours, $p=0.02$). In subgroup analysis, the LOS was significantly lower if the index procedure performed was laparoscopic when comparing ERAS vs. pre-ERAS (77.9 hours vs 121.8 hours, $p=0.001$). ERAS did not confer a significant decrease in LOS with open procedures (117.0 vs 138.7 hours, $p=0.54$). The overall readmission rate was 7.5% with no significant difference between ERAS and pre-ERAS patients (14% vs. 6%, $p=0.18$). There was no significant difference in the rate of complications.

Conclusions/Discussion: Utilizing an ERAS protocol is safe and effective for loop ileostomy closure with a shorter length of stay and no difference in readmission rates. However, the shortened length of stay was only seen with patients who initially underwent a laparoscopic procedure. The difference between the laparoscopic and open cohort requires further investigation.

VALUE OF AN INTERACTIVE PHONE APPLICATION IN AN ENHANCED RECOVERY PROGRAM.

P366

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Purpose/Background: An interactive phone application, SeamlessMD, was added to our established colorectal enhanced recovery after surgery (ERAS) program. The aim of this study was to determine the impact of this application on readmission rates, length of stay and total costs of patients undergoing elective colorectal surgery.

Methods/Interventions: We identified patients undergoing laparoscopic or open elective colorectal surgery between February 2017 to July 2018 at a single institution

with an established ERAS protocol. Patients were further grouped with and without application enrollment. The two groups were compared on age, sex and race using Welch's t-test and chi-square tests. For each of the laparoscopic and open groups, nested linear and logistic models controlling for age were created and compared to evaluate differences in readmission rates, length of stay, and total hospital costs between patients who enrolled in the application and those who did not.

Results/Outcome(s): The cohort contained a total of 291 patients, 147 enrolled and 144 not enrolled in the application. There were no significant differences between enrollees in terms of sex ($p=0.45$) or race ($p=0.72$). The mean age of patients who enrolled in the application was 52.7 (± 16.2) years compared to 58.5 (± 14.1) years for patients not enrolled in the application ($p=0.001$). Due to the significant difference in ages between these two groups, all subsequent analyses of readmission rate, length of stay and cost were controlled for age. There were 110 patients who underwent laparoscopic procedures versus 181 patients who underwent open procedures. Readmission rates, lengths of stay, and total costs for those undergoing laparoscopic procedures were not significantly different between those who enrolled in application (10.1%; means: 3.8 days and \$10,623) and those who did not (2.4%; means: 4.0 days and \$10,885; $p=0.19$, 0.58, and 0.60). In contrast, among patients undergoing open procedures, the mean length of stay for those who enrolled in the application was 4.9 (± 2.8) days, as compared to 7.4 (± 6.9) days for those without the application ($p=0.003$). The readmission rates and total costs for open procedures with and without application did not significantly differ (17.9% and \$12,338 versus 13.6% and \$15,091; $p=0.052$ and 0.11).

Conclusions/Discussion: Use of an interactive phone application is a useful adjunct in an established enhanced recovery program with a significant reduction in length of stay and trend toward decreased readmission rates in patients undergoing open colorectal procedures without increasing total cost.

OPTIMIZING DISCHARGE DECISION-MAKING IN COLORECTAL SURGERY: AN AUDIT OF DISCHARGE PRACTICES IN A NEWLY IMPLEMENTED ENHANCED RECOVERY PATHWAY.

P367

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Purpose/Background: Evidence supports that enhanced recovery pathways (ERPs) reduce hospital length of stay (LOS) after colorectal surgery, but challenges in implementation remain. Standardized discharge criteria (DC)

have been defined by international consensus and, in a well-established ERP, we previously found no difference between time to readiness for discharge (TRD) and actual LOS. However, this may not be the case in a newly implemented pathway. We performed an internal audit of colorectal surgery discharge practices in an institution with a newly implemented colorectal ERP. The overall aims of this audit were to (1) compare the TRD to actual LOS and (2) identify reasons for delay in discharge once DC are achieved.

Methods/Interventions: After institutional approval, we conducted a prospective observational study of consecutive adult patients (>18 years) who underwent elective colorectal surgery at a university teaching hospital between February and August 2018. Patients were treated within a recently implemented ERP (<2 years) where hospital DC are not standardized (i.e. based on clinician's personal judgment). TRD was assessed by an independent evaluator from the day of surgery until patients fulfilled DC defined by international consensus (tolerance of oral intake, recovery of bowel function, adequate pain control, ability to walk and self-care, and absence of clinical or laboratory evidence of complications). The correlation-adjusted log-rank test was used to test equality between TRD and LOS. Physicians were interviewed, and thematic analysis was used to assess reasons for patients remaining in hospital after discharge criteria were achieved.

Results/Outcome(s): Seventy-three patients were included (age 67 ± 14 years, 56% male, 25% Standard Charlston Comorbidity Index >2, 30% ASA \geq III, 50% laparoscopic, 16% stoma creation). Median LOS was 6 days (IQR 4-8) while median TRD was 5 days (IQR 3-8) ($p<0.001$). Twenty-eight patients (37%) remained in hospital after DC were achieved. Where $LOS>TRD$, patients remained a median of 2 (IQR 1-3) days past TRD. Our thematic analysis suggests that most of the delayed discharges were medically justified [i.e. pending workup of a suspected complication (31%), persistent diarrhea or high stoma output (19%)], but medically unnecessary hospital stays were common [i.e. patient unwilling to be discharged (13%), insufficient postdischarge support/awaiting disposition (13%), surgeon judgement of insufficient recovery (i.e. awaiting bowel motion, 13%)].

Conclusions/Discussion: Delayed hospital discharges in a newly implemented colorectal surgery ERP are often medically justified, but unnecessary hospital stays are common and represent a target for quality improvement. Efforts should be directed at optimizing patient education regarding discharge expectations, early consultation of the discharge planning team and improving discharge decision-making using standardized hospital DC.

THE USE OF MULTIMODAL ANALGESIA TO ACHIEVE OPIOID FREE COLORECTAL SURGERY.

P368

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Purpose/Background: Opioid analgesia remains the mainstay of post-operative pain management strategies, despite advances in surgical care. Their use is almost ubiquitous, and often as monotherapy. Opioids are associated with many adverse effects, including ileus, urinary retention and excessive sedation. In addition, there are concerns about the wider abuse of opioids in society, leading to rising rates of overdose deaths. The Center for Colon and Rectal Surgery have refined an opioid-free enhanced recovery after surgery analgesia protocol. The aim of this study was to quantify our recent experience and to identify factors that might contribute to opioid-free surgery.

Methods/Interventions: A retrospective study of all patients receiving abdominal colorectal surgery within the Center for Colon and Rectal Surgery at Florida Hospital, Orlando, from October 2017 to March 2018 inclusive was performed. All non-emergent patients undergoing abdominal colorectal surgery were included. Data on patient demographics, perioperative indications and management, analgesic requirements, morbidity and length of stay (LOS) was collected. Data were analyzed with one-way ANOVA and χ -squared test (Minitab 18, PA. USA).

Results/Outcome(s): 303 consecutive patient records were analyzed during the study period. Of note, the majority of patients received minimally invasive surgery (206 patients, 68%), and that the indications ranged from malignancy, inflammatory bowel disease as well as reversal of ostomies. 93 (30.7%) patients did not receive any narcotics in the post-operative period. A further 109 (36%) patients did not receive narcotics once they left the post-anesthesia care unit (PACU). Patients in the non-narcotic cohort were significantly older, more likely to be operated on for malignancy and less likely to have a post-operative complication.

Conclusions/Discussion: Our study demonstrates that multi-factorial, multi-modal approaches to perioperative analgesia can result in high rates of non-opioid use in the post-operative care setting. Over two-thirds of patients over the study periods required no narcotics after discharge from PACU. Unsurprisingly, patients who received opioid-free surgery had shorter LOS and fewer complications. Limitations include its retrospective nature and that it is from a single institution. Nonetheless, the type of surgery and patient settings do compare favorably with other populations around the United States. Despite these limitations, this study provides proof of concept that opioid-free surgery is possible within the setting of an ERAS colorectal surgery

program. Further work is needed to investigate factors in perioperative analgesic challenges that may lead to higher rates of opioid-free surgery.

IMPROVED HIGH-QUALITY COLON CLEANSING WITH 1 L NER1006 VERSUS 2 L POLYETHYLENE GLYCOL + ASCORBATE OR ORAL SULFATE SOLUTION.

P369

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Purpose/Background: Colonoscopy requires bowel cleansing for visualization of the gut mucosa, and high-quality cleansing facilitates lesion detection. NER1006 is a low volume, 1 L polyethylene glycol (PEG) bowel preparation approved in 2018 for colon cleansing prior to colonoscopy in adults. This post hoc analysis of 2 randomized trials (MORA and NOCT) investigated the cleansing efficacy of NER1006 that was assessed, as in clinical practice, by site endoscopists.

Methods/Interventions: Patients received NER1006, 2 L PEG + ascorbate (2 L PEG), or oral sulfate solution (OSS) as a 2-day evening/morning split-dose regimen (pm/am). One day morning-only NER1006 (am/am) split-dosing on day of colonoscopy was also evaluated in 1 study. Analyses were conducted for 3 groups: a modified full analysis set (all randomized patients except those who failed to meet entry criteria post-randomization and did not receive any study drug) with either imputed failures included (mFAS; n=1378) or excluded (mFAS2; n=1319), and patients in the mFAS with 100% treatment adherence (mFAS100; n=1047). Cleansing was assessed using the validated Harefield Cleansing Scale (HCS). Overall cleansing success (HCS grade A or B), overall high-quality cleansing (HCS grade A), and high-quality cleansing of individual colon segments (HCS segmental scores 3 or 4) were determined.

Results/Outcome(s): Overall cleansing success in the 3 populations (**Table**) was higher with NER1006 pm/am (92.7%–97.5%) vs 2 L PEG (87.9%–93.0%), and more patients had overall high-quality cleansing (**Table**) with NER1006 pm/am (68.0%–72.1%) and NER1006 am/am (64.0%–68.4%) vs 2 L PEG (50.7%–56.0%). When imputed failures were excluded (mFAS2), NER1006 pm/am provided a higher rate of overall high-quality cleansing vs OSS (74.5%–77.3% vs 67.8%–69.8%; **Table**). More high-quality colon segments (**Table**) were observed with NER1006 pm/am (82.5%–87.1%) and NER1006 am/am (79.3%–84.4%) vs 2 L PEG (70.4%–76.3%), and with NER1006 pm/am (82.7%–89.5%) vs OSS (78.1%–84.4%). For 100% adherent patients (mFAS100) with overall cleansing failure (HCS grade C or D), NER1006 pm/am provided a higher rate of patients with ≥ 1 high-quality segment than OSS (85.7% [12/14 patients] vs 46.7%

[7/15]; $P=0.01$) and a higher percentage of segments with high-quality cleansing than OSS (45.7% [32/70 segments] vs 22.7% [17/75]; $P=0.002$) in the overall treatment group.

Conclusions/Discussion: When assessed by site endoscopists, NER1006 delivered greater high-quality, HCS grade A cleansing than either 2 L PEG or OSS. In patients who experienced an overall cleansing failure despite excellent treatment adherence, NER1006 achieved better high-quality cleansing than OSS.

Table. Cleansing Success*

Population	MORA			NOCT	
	NER1006 PM/AM	NER1006 AM/AM	2 L PEG	NER1006 PM/AM	OSS
Overall Bowel Cleansing Success					
mFAS, % (n/n)	92.7 (255/275)	89.5 (246/275)	87.9 (239/272)	87.3 (241/276)	88.6 (248/280)
<i>P</i> value [†]	0.03	0.28	–	0.68	–
mFAS2, % (n/n)	97.0 (255/263)	91.1 (246/270)	90.9 (239/263)	93.1 (241/259)	93.9 (248/264)
<i>P</i> value [†]	0.002	0.46	–	0.66	–
mFAS100, % (n/n)	97.5 (199/204)	93.3 (180/193)	93.0 (186/200)	93.8 (211/225)	93.3 (210/225)
<i>P</i> value [†]	0.02	0.46	–	0.42	–
Overall High-Quality Bowel Cleansing Success					
mFAS, % (n/n)	68.0 (187/275)	64.0 (176/275)	50.7 (138/272)	69.9 (193/276)	63.9 (179/280)
<i>P</i> value [†]	<0.001	<0.001	–	0.07	–
mFAS2, % (n/n)	71.1 (187/263)	65.2 (176/270)	52.5 (138/263)	74.5 (193/259)	67.8 (179/264)
<i>P</i> value [†]	<0.001	0.001	–	0.04	–
mFAS100, % (n/n)	72.1 (147/204)	68.4 (132/193)	56.0 (112/200)	77.3 (174/225)	69.8 (157/225)
<i>P</i> value [†]	<0.001	0.006	–	0.04	–
High-Quality Segmental Cleansing					
mFAS, % (n/n)	82.5 (1134/1375)	79.3 (1091/1375)	70.4 (958/1360)	82.7 (1141/1380)	78.1 (1093/1400)
<i>P</i> value [†]	<0.001	<0.001	–	0.001	–
mFAS2, % (n/n)	86.6 (1134/1310)	82.3 (1091/1325)	74.8 (958/1280)	88.1 (1141/1295)	82.8 (1093/1320)
<i>P</i> value [†]	<0.001	<0.001	–	<0.001	–
mFAS100, % (n/n)	87.1 (888/1020)	84.4 (814/965)	76.3 (763/1000)	89.5 (1007/1125)	84.4 (950/1125)
<i>P</i> value [†]	<0.001	<0.001	–	<0.001	–

*Using the HCS: Each colon segment scored between 0-4. Grade A = all 5 segments scored ≥ 3 ; Grade B = one or more segments scored 2, remaining scored ≥ 3 ; Grade C = one or more segments scored 1, remaining scored ≥ 2 ; Grade D = one or more segments scored 0.

[†]NER1006 vs the comparator in the same trial.

HCS = Harefield cleansing scale; mFAS = modified full analysis set; mFAS2 = mFAS excluding imputed failures; mFAS100 = patients in mFAS with 100% treatment adherence; OSS = oral sulfate solution; PEG = polyethylene glycol.

HOSPITAL FACTORS AND 30-DAY READMISSION RATES IN COLORECTAL SURGERY.

P370

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Purpose/Background: Surgical 30-day readmission rates are frequently used as an indicator of quality of care, as well as a determinant for imposing financial penalties on hospitals nationwide. Patient-level and hospital-level characteristics influence readmission rates with patient-level characteristics having the greatest impact. However, change at the hospital-level would be most effective in improving the rate of surgical 30-day readmissions. Unfortunately, a reliable set of hospital-level predictors of 30-day readmission following major surgery is unknown. Our objective is to identify a practical subset of hospital-level characteristics that are important in predicting all-cause 30-day readmission following major colorectal surgery.

Methods/Interventions: The Healthcare Cost and Utilization Project-State Inpatient Databases (HCUP-SID), and the American Hospital Association Annual Health Survey databases (AHA) were combined to create a database of patient-level and hospital-level data from 8 states during 2009-2013. Using available information from the combined HCUP-SID/AHA database, hospitals were divided into quartiles based on the unadjusted, all-cause 30-day readmission rates, which were calculated for patients undergoing major colorectal surgery based on 58 ICD9 procedure codes. Random forest, decision tree, and logistic regression models were performed in order to identify which hospital-level characteristics were important predictors of and/or had an association with 30-day all cause readmission after major colorectal surgery.

Results/Outcome(s): 2,273 hospitals and 496,198 patients were included in our analyses of 119 patient-level and hospital-level characteristics, for which all data was available or <30% was missing from the HCUP-SID/AHA database. The unadjusted, all-cause 30-day readmission rates following major colorectal surgery were 9.5% (Q1), 10.95% (Q2), 11.62% (Q3), and 15.38% (Q4). All three prediction models were performed for all quartiles using the same variables, of which 44 were determined to be both important and statistically significant ($p<0.05$). Majority of these variables were patient-level characteristics. The decision tree model for hospitals in Q1 had the overall highest predictive accuracy for 30-day readmission, 93.8% (AUC 0.8453) with 95.4% sensitivity and 73.3% specificity. The hospital-level characteristics that were both important and significant ($p<0.05$) in predicting 30-day readmission included hospital types Rural and Metropolitan, total facility Medicare inpatient days (MDCIPD), total full time personnel (FTE), total full time trainees (FTETTRN), adjusted average daily census (ADJADC), adjusted admissions (ADJADM), and adjusted patient days (ADJPD). The odds of a patient being readmitted within 30-days of surgery were higher at Rural and Metropolitan type hospitals, and with increased FTE and ADJPD. Whereas, the odds of a patient being readmitted within 30-days of surgery were lower with increased MCRIPD, FTETTRN, ADJADC, and ADJADM.

Conclusions/Discussion: Eight hospital-level factors were identified as both important and significant in predicting 30-day readmission after colorectal surgery. Patients who underwent colorectal surgery at hospitals with increased medicare inpatient days, more full time trainees, and higher adjusted admissions or adjusted average daily census were less likely to be readmitted within 30 days. Nearly 50 additional hospital-level characteristics, while not significant in this analysis, were still identified as important in predicting 30-day readmission with good predictive accuracy. This analysis suggests institutional characteristics that may be modified to impact probability of readmission following colorectal surgery. Further analysis of these factors could help guide quality improvement efforts at the hospital-level.

OPIOID PRESCRIBING PATTERNS AFTER ANORECTAL SURGERY: ARE WE OVER-PRESCRIBING?

P371

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Purpose/Background: Given the current opioid epidemic, there is a real need to evaluate the prescribing patterns in surgery. A pragmatic decrease in post-operative opioid prescribing could lower the amount of unused prescriptions that are stored insecurely or diverted to unintended persons, decreasing risk to the public. A unifying protocol does not exist at our hospital for opioid prescribing after anorectal surgery. The aim of this study is to define provider prescribing patterns and patient self-reported usage following anorectal surgery at an academic medical center in order to better understand prescribing needs.

Methods/Interventions: A prospectively maintained database was evaluated for consecutive patients who underwent anorectal surgery between 7/5/18 and 11/5/18 by four board-certified colon and rectal surgeons. Patient characteristics, surgery type, post-operative prescriptions, and outpatient opioid usage were recorded. Surgical procedures were categorized by fistula, hemorrhoid, and other (sphincterotomy, excision/fulguration of anal or rectal lesion). Opioids were converted into morphine milligram equivalents (MME) using conversion factors published by Centers for Medicare and Medicaid Services (CMS). ANOVA was used to compare prescription usage among surgical categories. P-values <0.05 were considered significant.

Results/Outcome(s): A total of 125 procedures and initial prescriptions were recorded. Documentation of outpatient opioid usage in post-op clinic notes was complete for 102 patients. The mean age was 52.5 ± 14.8 years old and 59% were male. The majority of the patients were white (74%). Mean BMI was 29 ± 6 and the majority of the patients were ASA 2 (62%). Thirty percent had prior anorectal procedure, 5% were using opioids chronically, 12% were using anxiolytic, and 23% were using antidepressants. Patients reported active smoking 13%, daily alcohol use (>7 /wk) 11%, illicit substance use 6% (marijuana use 4%, cocaine use 2%, heroin use 1%, amphetamine use 1%). Perianal nerve block was performed using liposomal bupivacaine (Exparel) in 50% of cases with highest use in the hemorrhoid group, while the remainder were managed with used lidocaine and/or Marcaine. This study occurred during a transition period for adoption of liposomal bupivacaine and usage rates were higher in cases performed later in the series. Two patients (2%) were admitted for post-op pain control with the remainder (98%) discharged on day of surgery. Post-operative prescriptions were written by resident or fellow in 98% of cases. The opioids prescribed were oxycodone, hydrocodone, codeine, hydromorphone, and tramadol with opioid/NSAID combination pills accounted for 37% of prescriptions. A prescription for ibuprofen

600mg was provided for 61%. All patients received instructions for taking over the counter NSAIDs. Diazepam was prescribed for 47% of cases and was significantly higher among hemorrhoid group. The average pill count for opioid prescriptions was 25.6 ± 12.2 with pill count and average MME significantly higher in hemorrhoid than fistula and fistula higher than Other group. At average follow-up time of 17.9 ± 7.0 days, 94% of patients reported no pain at their first postoperative office visit. Average pill number used and MME used in the outpatient setting was significantly different among surgery category with hemorrhoid group having the highest usage. Patients that received liposomal bupivacaine had significantly lower MME use in the hemorrhoid group, but this difference was not seen in all surgery groups. Patients had on average 15.1 ± 14.4 pills from their original prescription remaining at follow-up accounting for an average excess of 107.0 ± 104.3 MME remaining in the patient possession. There were 7 patients who required opioid prescription refills with 5 (11%) in hemorrhoid, 1 (2%) fistula, and 1 (3%) in other groups.

Conclusions/Discussion: At a single academic hospital, provider opioid prescribing patterns are widely variable after anorectal surgery and appear to be highly dependent on the procedure. Liposomal bupivacaine injection was associated with lower opioid usage after hemorrhoid surgery and does not appear to be used consistently for all cases. Notably 58% of opioids prescribed after anorectal surgery were unused by the patient and thus pose a significant public health risk. Based on usage patterns observed in this study, protocols should be established to optimize opioid prescribing.

WHAT ARE THE SAFETY CONCERNS OF SURGICAL MESH?

P372

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Purpose/Background: We determined safety concerns and suspected device-associated deaths, serious injuries, and malfunctions of surgical meshes across surgical specialties.

Methods/Interventions: We reviewed all mandatory and voluntary adverse events reported to the U.S. Food & Drug Administration (FDA) from 1/2008 through 3/2018. Next, from the case data, we extrapolated mesh types, procedure type, surgical specialty, malfunction, and associated complication/adverse event. Then, we determined the surgical specialties with the highest rates of mesh adverse events, identifying those adverse events attributable to particular mesh procedures.

Results/Outcome(s): From the 8,310 mesh reported events collected by the FDA, we identified 6,169 unique mesh case events of which 52% of reports were pelvic floor, 27% gynecology, and 8% general surgery. Compared to the calendar year 2008, pelvic floor adverse events rose 17-fold, plateauing in the year 2013. The most

common adverse events reported in pelvic floor procedures were pain (68%), severe injury (51%), and/or need for further medical treatment (14%). Pelvic floor patients also experienced substantial concerns related to vaginal scarring/stenosis, genital pain, and dyspareunia. In addition, pelvic floor patients were significantly more likely to report more than one adverse event (≥ 2 events) compared to nonpelvic floor patients (70+/-2 vs 33+/-2%; $p < 0.0001$), respectively. Patients with pelvic floor procedures were 5 times more likely to undergo mesh removal 18+/-1.5% compared to nonpelvic floor patients, 4+/-1% ($p < 0.0001$). Last, pelvic floor patients were more likely than those nonpelvic floor patients to need a re-operation/revision surgery (31+/-1.5% vs 9+/-1% ($p < 0.0001$)).

Conclusions/Discussion: The placement of mesh during surgical procedures is associated with a large and morbid list of adverse events. Pelvic floor procedures have a disproportionate number of adverse event reports exhibiting a rapid rise since the year 2008. In addition, pelvic floor procedures have the highest rate of multiple adverse events, reoperations/revisions, and need for mesh removal. We propose a post market surveillance system for pelvic floor surgical meshes that prospectively captures all implants and is regularly reviewed.

LAPAROSCOPIC SUTURE RECTOPEXY FOR RECTAL PROLAPSE: A SINGLE INSTITUTION EXPERIENCE OF 328 CASES.

P373

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Purpose/Background: Recently, laparoscopic ventral mesh rectopexy has been widely performed in the treatment of rectal prolapse. However, attaching a non-absorbable mesh to the rectum and vagina may result in significant complications, such as rectal or vaginal erosion, fistulation, or stricturing, which are difficult to treat. The aim of this study was to evaluate the safety and efficacy of laparoscopic suture rectopexy in 328 cases at a single institution.

Methods/Interventions: A retrospective review of all 328 patients who had undergone laparoscopic suture rectopexy using a standardized simple suture technique at a single institution from October 2010 to December 2017 was analyzed. Patient characteristics, previous treatment, operating time, blood loss, hospital stay, complications, bowel habits, and recurrence were reviewed.

P371

	Statistic	Surgery Category				ANOVA/Chi ²
		All Cases	Hemorrhoid	Fistula	Other	
Cases	n	125	45	42	38	
Prior Anorectal Procedure	n (%)	38 (30%)	4 (9%)	26 (62%)	8 (21%)	*p=0.003
Discharge Day 0	n (%)	123 (98%)	44 (98%)	42 (100%)	37 (97%)	
Exparel Used	n (%)	63 (50%)	30 (67%)	22 (52%)	11 (29%)	*p=0.002
Prescribed	n	125	45	42	38	
Opioid Pill Count	mean \pm sd	25.6 \pm 12.2	32.1 \pm 11.6	25.6 \pm 11.7	18.1 \pm 8.9	*p<0.001
-MME	mean \pm sd	184 \pm 98.1	238.2 \pm 99.6	180.2 \pm 85.6	127.6 \pm 74.0	*p<0.001
Opioid/NSAID Combo	n (%)	45 (37%)	22 (50%)	9 (22%)	14 (37%)	*p=0.027
Ibuprofen 600	n (%)	76 (61%)	29 (64%)	25 (60%)	22 (58%)	
Diazepam	n (%)	59 (47%)	30 (67%)	20 (48%)	9 (24%)	*p<0.001
- mg Diazepam	mean \pm sd	34.7 \pm 15.9	37.3 \pm 18.0	33.0 \pm 13.1	30.2 \pm 14.4	
Used	n	102	42	32	28	
Opioid Pill Count (rx1)	mean \pm sd	11.6 \pm 14.2	18.6 \pm 15.3	9.4 \pm 13.8	3.7 \pm 6.1	*p<0.001
No opioids taken	n (%)	35 (35%)	7 (17%)	13 (41%)	15 (56%)	*p=0.002
MME Used (total)	mean \pm sd	91.9 \pm 125.0	156.5 \pm 147.2	65.1 \pm 98.2	22.3 \pm 39.4	*p<0.001
- Exparel	mean \pm sd	86.33 \pm 122.0	*121.4 \pm 142.7	71.9 \pm 105.3	23.9 \pm 44.9	
- No Exparel	mean \pm sd	99.1 \pm 129.8	*219.7 \pm 137.8	55.6 \pm 90.7	21.4 \pm 36.8	
	ANOVA		*p=0.037			
Excess (Used - Prescribed)	n	102	42	32	28	
Opioid Pill Count (rx1)	mean \pm sd	15.1 \pm 14.4	13.9 \pm 15.6	17.3 \pm 14.6	14.3 \pm 10.2	
MME Excess (rx1)	mean \pm sd	107.0 \pm 104.3	95.5 \pm 115.9	128.5 \pm 107.0	100.4 \pm 80.0	
Refill Required	n (%)	7/125 (6%)	5/45 (11%)	1/42 (2%)	1/38 (3%)	

Results/Outcome(s): The study included 33 men and 295 women with a mean age of 73 (range 14- 93). Thirteen patients had undergone rectal prolapse surgery previously. The average operating time was 130 minutes and the average blood loss was 11 ml. Four patients needed a mini-laparotomy during surgery due to difficult fixation or bleeding. In the early postoperative period, five patients developed postoperative complications, three developed port site hernias, one had a small bowel obstruction, and one other had a perirectal abscess. No patient complained of difficult evacuation or significantly increased constipation postoperatively. During the follow-up, recurrence occurred in 26 patients (7.9%). Among the 26 patients, 10 presented with full length recurrence, requiring a redo laparoscopic suture rectopexy in nine patients, and open suture rectopexy in one. The remaining 16 patients presented with mucosal or short length prolapses, less than 3 cm, and they underwent subsequent procedures including Thiersch operations and Delorme operations; no recurrence occurred after the second procedure.

Conclusions/Discussion: This study shows that laparoscopic suture rectopexy without a mesh is an effective treatment for patients with rectal prolapse with low morbidity and low recurrence rates. Potential mesh-related complications can be avoided using this procedure.

DOES DECREASED LENGTH OF STAY AFTER COLORECTAL SURGERY TRANSLATE INTO INCREASED READMISSION RATES?

P374

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Purpose/Background: Pay for performance incentives introduced by the Centers of Medicare and Medicaid Services (CMS) have augmented financial incentives for shorter Length of Stay (LOS) and amplified penalties for higher than expected readmission rates. The wide spread adaptation of Enhanced Recovery after Surgery (ERAS) protocols for Colorectal Surgery have resulted in further

shortening of LOS. Conversely, multiple studies have indicated an inverse relationship between LOS and readmission rates, raising concerns that fast-track protocols can result in premature discharge leading to an increased rate of readmissions. While there is clear evidence that post operative complications lead to an increased LOS and readmission rate, this relationship is not known for patients who do not experience any post-operative complications. We hypothesize that for Colorectal Surgery patients who recover without complications, a shorter LOS will have a higher readmission rate.

Methods/Interventions: We performed a single-institution retrospective cohort study of patients undergoing laparoscopic and open operations involving small and/or large bowel resection performed by colorectal surgeons from 2011 to 2017. Patient characteristics and readmission data were collected. Patients who had an inpatient complication were excluded from analysis. The cohort was divided into two groups based on LOS (≤ 6 days and >6 days) and the two groups were compared using Chi-squared test. Our primary outcome measure was 30-day readmission rate.

Results/Outcome(s): There was no significant difference in patient age, sex, BMI, IBD, cancer, or patient co-morbidities (Table 1). Our 30-day readmission rate was 11.5%. There was a nearly significant positive association between LOS and 30-day readmission (OR=1.06 per day admitted, $P=0.06$). In patients that had LOS of 6 days or less, there was a nearly significant reduction in readmission rate (OR=0.71, 10.0% vs 13.6%, $P=0.06$).

Conclusions/Discussion: Our data demonstrate that in patients who undergo an uneventful recovery after colorectal operations, there is no significant increase in readmission rate with shorter LOS. In fact, our data trended towards the opposite effect, with patients that had LOS ≤ 6 days having a nearly significant decreased risk of readmission. In summary, decreased LOS is not associated with increased 30-day readmission rate and may have an overall protective effect. Our findings help to alleviate some of the apprehension associated with early discharge commonly experienced by physicians and patients alike.

P374 Table 1. Patient Characteristics by 30-Day Readmission

Characteristic	Readmission	No Readmission	P-Value
Age	56.9(17.8) Years	56.8(15.7) Years	0.96
Sex	49.3% Male	48.2% Male	0.50
BMI	29.4(7.93)	28.9(7.05)	0.41
Diabetes	18.3% (38.7)	14.7% (35.4)	0.26
CAD	0.7% (8.4)	1.6% (12.4)	0.43
COPD	12.7% (33.3)	10.1% (30.1)	0.34
Malignancy	75.3% (43.1)	69.4% (46.1)	0.14

BMI; Body Mass Index, CAD; Coronary Artery Disease, COPD; Chronic Obstructive Pulmonary Disease. Listed values are mean values or percentages. Parenthesis are standard deviations.

DIVERTING COLOSTOMY IS AN EFFECTIVE AND FEASIBLE METHOD FOR SEVERE HEMORRHAGIC RADIATION PROCTITIS.

P375

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Purpose/Background: Severe hemorrhagic chronic radiation proctitis (CRP) is a very difficult issue for recurrent bleeding. The aim of this series study is to evaluate the efficacy of colostomy and rate of stoma closure for severe hemorrhagic CRP.

Methods/Interventions: Patients with hemorrhagic CRP who underwent colostomy in our medical center were enrolled. Rectal bleeding, hemoglobin levels, and endoscopic scores by rectal telangiectasia density (RTD) were recorded before and after stoma, respectively. Anorectal functions assessed by chronic radiation proctitis symptom scales (CRPSS) and quality of life by EORTC-C30 questionnaire were followed and assessed.

Results/Outcome(s): A total of 738 patients with CRP were screened. 54 cases underwent colostomy and 16 of them were indicated for severe rectal bleeding. Among these 16, 12 were followed, two were lost and two were dead of tumor recurrence. The mean hemoglobin (Hb) was 68 g/l and 10 of 12 patients received transfusions before stoma. During follow-up, all of 12 patients indicated complete remission of bleeding and colostomy was successfully reversed in 11 of 12 patients (92%). The remaining one was due to old age (83 years old). The median duration of stoma was 18 (range: 9-53) months. The mean Hb level increased gradually from 76 g/l at 3 mo, 99 g/l at 6 mo, 103 g/l at 9 mo, to 112 g/l at 1 year and 117 g/l at 2 years after stoma. Telangiectasia and rectal bleeding under endoscopy were greatly improved at stoma closure and endoscopic scores decrease from 3 to 1 point (P<0.001). Almost normal anorectal functions were reached and normal quality of life was observed after stoma reverse. No major complications were occurred except stoma-related problems in three patients were observed.

Conclusions/Discussion: Diverting colostomy is a very effective method in the remission of refractory bleeding in CRP. Meanwhile, stoma can be reversed and anorectal functions can be obtained after reversal.

Characteristics	case 1	case 2	case 3	case 4	case 5	case 6	case 7	case 8	case 9	case 10	case 11	case 12	Median (range) or %
Age	73	82	69	68	59	72	58	72	66	67	62	68	68(47-83)
Sex	F	F	F	F	F	F	M	F	F	F	F	F	11(1/83%)
Primary cancer	Cervix	Cervix	Cervix	Cervix	Cervix	Cervix	Rectum	Cervix	Cervix	Bladder	Cervix	Cervix	16(Cervix:83%)
Operation (Stoma Op)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	95(56/94)
Duration of bleeding (mo)	19	16	14	21	15	18	8	7	15	10	10	8	14.5(7-21)
Pre-Op transfusion (unit)	50	80	60	20	40	30	40	—	60	20	20	20	44.5(7-70)
Duration of stoma (mo)	48	34	18	10	34	9	26	26	15	12	53	10	18(8-53)
Indication of colostomy	severe anemia	severe anemia	severe anemia	severe anemia	severe anemia	severe anemia	moderate anemia	severe anemia	moderate anemia	severe anemia	severe anemia	severe anemia	67(98-100)
Pre-Op Hb (g/l)	44	36	78	63	38	35	71	87	62	108	100	105	87(28-108)
Hb (Post-Op 6 mo)	85	—	80	—	84	—	85	87	—	108	—	118	89(85-118)
Hb (Post-Op 1 mo)	—	—	—	100	—	75	120	—	123	114	—	117	109.5(75-120)
Hb (Post-Op 2 years)	—	—	118	102	—	111	126	120	114	—	110	—	114(102-126)
Stoma closure	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	11(92/92%)
Stoma complications	hernia	—	—	—	—	—	prolapse	—	obstruction	—	—	—	3(Yes:25%)
RTD score (Pre-Op)	3	3	3	3	3	3	3	2	2	3	2	3	3(2-3)
RTD score (Post-Op)	1	1	1	1	1	1	1	1	1	1	1	1	1(0-1)
Treatment after stoma	—	—	—	—	—	APC 1	—	APC 1	—	—	APC 1	—	—

Abbreviations: ca: cancer; Op: operative; F/M: female/male; Hb: hemoglobin; RTD: rectal telangiectasia density; mo: month.

A WEB-BASED PATIENT ENGAGEMENT PLATFORM IDENTIFIED AREAS FOR IMPROVEMENT IN COMPLIANCE WITH PRE-OPERATIVE CARE AMONG PATIENTS UNDERGOING ELECTIVE COLECTOMY OR PROCTECTOMY.

P376

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Purpose/Background: Patient engagement technology has the potential to improve patient experience as well as compliance with care in the perioperative period. In particular, such technology can improve patient knowledge about and compliance with Enhanced Recovery after Surgery (ERAS) pathways. In a pilot study, we evaluated the effect of a patient engagement platform on surgical outcomes and ERAS compliance among patients undergoing elective colectomy or proctectomy.

Methods/Interventions: Adult patients undergoing elective colectomy or proctectomy at an academic medical center from October 2017 through May 2018 were invited to enroll in a web-based patient engagement platform accessible by smartphone, tablet or desktop (intervention group). The platform provided education about the perioperative process and reminders to comply with perioperative ERAS instructions including bowel preparation, oral antibiotics and dietary changes before surgery. In addition to reminders, the platform also surveyed patients on their compliance with ERAS instructions. Each intervention patient was matched to a control from the same time period by age, sex, and operation. We examined National Surgical Quality Improvement Program (NSQIP) outcomes data and ERAS compliance data. Student's t-test or ANOVA were used as appropriate to compare differences between groups.

Results/Outcome(s): 55 control and 55 intervention patients were evaluated with average age 56 years, 51% female, and 40% open approach. There were no differences in body mass index (24.7 vs 25.9, respectively, p=0.25) or ASA class (p=0.94) between groups. Average length of stay was 6.5 vs 5.1 days (p=0.15) in control vs. intervention groups. There were no differences in surgical outcomes between groups. Among those in the intervention group, 28/55 (51%) completed a pre-operative survey about their preparedness for surgery. We considered completion of this survey a marker of engagement with the platform before surgery. Patients who completed the pre-operative survey were not demographically different from those who did not complete the pre-operative survey; although they tended to be younger (54 vs. 59 years, respectively) and female (57 vs. 44%, respectively). Surgical outcomes did not differ between those who did or did not complete the pre-operative survey. Preadmission counseling was documented in the medical record for 100% of patients. However, two patients self-reported through the platform that they

did not receive any counseling on what to expect in the perioperative period. While there was 100% compliance for prescription of preoperative bowel preparation and oral antibiotics, the pre-operative survey results revealed that 9/28 (32%) of patients did not complete some portion of pre-operative ERAS orders (21% did not complete the bowel prep, 7% did not take all of the oral antibiotics, 11% did not drink clear liquids leading up to surgery and 11% did not drink a carbohydrate/electrolyte drink before surgery).

Conclusions/Discussion: A web-based patient engagement platform implemented in a colorectal surgery setting did not affect outcomes among patients undergoing elective colectomy or proctectomy. Only half of patients who signed up for the program engaged with the program before surgery. However, the platform revealed that a third of patients undergoing elective colectomy or proctectomy did not complete some portion of the ERAS protocol before surgery. Information from the platform highlights areas for improvement in the preoperative period.

IMPACT OF PATIENT ENGAGEMENT TECHNOLOGY ON PERIOPERATIVE OUTCOMES IN COLORECTAL SURGERY UNDER AN ENHANCED RECOVERY PROGRAM.

P377

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Purpose/Background: Patient engagement technologies (PETs) are designed to support patients through the surgical journey. It is unclear, however, how these technologies impact surgical outcomes under Enhanced Recovery Programs (ERPs). The aim of our study was to assess the impact of a PET on surgical outcomes for patients undergoing colorectal surgery under an ERP.

Methods/Interventions: We performed a retrospective cohort study of patients undergoing elective colorectal surgery at a single institution over 3 time periods: pre-ERP (pre-2015), ERP (2015-2017) and ERP+PET (2018). The PET (SeamlessMD) was implemented in 2018 and is an app-based program that engages with patients from the clinic visit to 30-days post-operatively. Each group of patients were cross-referenced with institutional National Surgical Quality Improvement Project (NSQIP) data. The primary outcome was length-of-stay (LOS) and 30-day readmission rates while secondary outcomes were 30-day NSQIP post-operative complications. Analysis of variance, Kruskal-Wallis, and Wilcoxon tests were performed to compare groups. All tests used an alpha level of 0.05 for statistical significance.

Results/Outcome(s): Of the 2,132 included patients, the three groups were pre-ERP (n=100), ERP (n=1914), and ERP+PET (n=118). Overall, the mean age was

56 years and 52% were females. The three groups were similar in age, race and co-morbidities including hypertension, COPD, end stage renal disease, and immunosuppression. Differences existed in rates of diabetes and smoking ($p < 0.05$). For LOS, the pre-ERP group had the longest median LOS of 5-days. With ERP, median LOS was significantly reduced to 3-days ($p < .001$). Compared to ERP, addition of PET did not further change LOS (3 vs. 3 days). For readmissions, the pre-ERP group had the highest 30-day readmission rate of 18.9%. These rates were reduced with ERP and ERP+PET (14.7 vs. 15.8%, $p = 0.56$). For post-operative complications, surgical site infections (SSI) rates were reduced with the implementation of PET when compared to ERP and pre-ERP (12.5 vs. 15.6 vs. 18.9%, $p = 0.58$, respectively) (Figure 1). There were no differences noted in other secondary outcomes including venous thromboembolism, cardiovascular incidents, renal failure, or UTIs

Conclusions/Discussion: At a single-institution, implementation of a PET maintained the beneficial effects of ERP and was associated with reductions in surgical site infections. Further studies, however, are needed to establish the long-term impact of PETs on surgical outcomes.

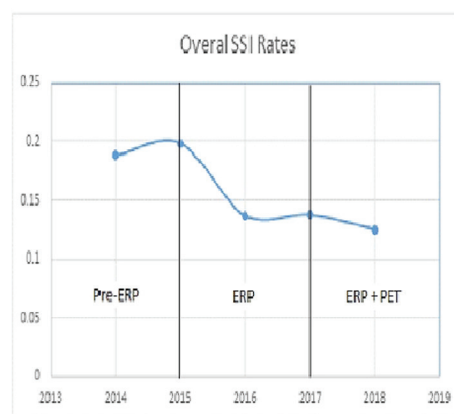


Figure 1. Overall Surgical Site Infection Rates over 3 time periods: pre-ERP (pre-2015), ERP (2015-2017) and ERP + PET (2018).

PREDICTING POSTOPERATIVE ILEUS AFTER COLORECTAL SURGERY IN AN ENHANCED RECOVERY PROTOCOL.

P378

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Purpose/Background: Postoperative ileus (POI) occurs in up to 30% of colorectal surgery patients and is associated with increased cost and morbidity. Risk factors for POI following abdominal surgeries via standard care pathways include colorectal surgery, open surgery, prolonged surgical duration, smoking, postoperative opioid use, and new stoma creation. As Enhanced Recovery Protocols

(ERP) are more widely utilized and accelerate patient recovery, the risk factors for POI should be reexamined in this modern era in order to optimize ERP and minimize morbidity for individual patients. Therefore, we aim to identify risk factors associated with POI following colorectal surgery via an ERP.

Methods/Interventions: A retrospective cohort study was performed for all patients undergoing colorectal surgery via an ERP at a single academic institution from July 2015 to July 2017. Inclusion criteria were age 18 years or older and those who underwent abdominal surgery by colon and rectal surgeons via an ERP. Exclusion criteria included lack of enrollment in the ERP and length of stay less than 24 hours. Patient demographics, medical history, outpatient medications, surgery indication and type, postoperative opioid use, length of stay, and postoperative complications were collected from the electronic medical record. Postoperative opioid consumption was calculated as oral morphine equivalents (OME). Based on definitions described in the literature, POI was defined as nasogastric tube insertion postoperatively or patient nil per os at least 4 days after surgery. Univariate logistic regression identified crude associations between variables and postoperative ileus. Multivariable logistic regression was then performed adjusting for predetermined variables that were clinically relevant based on existing literature and expert consensus.

Results/Outcome(s): Of the 530 patients (306 female, 224 male) included in the study, 81 patients (15.3%) developed POI. Patient demographics were similar between those with and without POI. History of psychiatric illness, antidepressant and antipsychotic use, duration of surgery, and ileostomy creation were significantly associated with POI on univariate analyses ($p < 0.05$). Multivariate analyses of clinically relevant variables showed that prolonged surgical duration (OR 1.003, 95% CI 1.000-1.005, $p = 0.022$), ileostomy creation (OR 2.179, 95% CI 1.267-3.748, $p = 0.005$), and history of psychiatric disorders (OR 1.862, 95% CI 1.097-3.159, $p = 0.021$) were risk factors for POI (see Table). Interestingly, open surgery, history of chronic pain, and increased OME consumption in the first 48 hours postoperatively were not risk factors on multivariate analyses. Additionally, several postoperative complications were also significantly associated with POI, including pulmonary edema, surgical site infection, bacteremia, urinary tract infection, pneumonia, anastomotic leak, small bowel obstruction, gastrointestinal bleeding, intensive care unit admission, re-intubation, surgical re-exploration, interventional radiologic procedure, and longer length of stay ($p < 0.05$).

Conclusions/Discussion: POI remains a common postoperative complication, associated with higher morbidity and costs, in patients undergoing colorectal surgery via an ERP. Our study demonstrated that longer duration of surgery, ileostomy creation, and history of psychiatric illness are the strongest risk predictors for POI in colorectal surgery patients when enrolled in an ERP. Surgical patients

with psychiatric comorbidities may be a higher risk population with opportunity for further research and intervention to reduce POI and related morbidity.

Risk factors for postoperative ileus with multivariable logistic regression

Variable	OR (95% CI)	p-value
ASA class	0.686 (0.409-1.149)	0.152
History of psychiatric illness	1.862 (1.097-3.159)	0.021*
History of chronic pain	0.813 (0.420-1.575)	0.540
Surgical indication	1.143 (0.954-1.369)	0.147
Malignant GI neoplasm	1.098 (0.411-2.936)	0.850
IBD and related complications	0.817 (0.327-2.041)	0.700
Benign GI neoplasm	0.379 (0.043-3.323)	0.380
Abdominal sepsis/diverticulitis/C diff colitis	1.683 (0.622-4.558)	0.310
Mechanical obstruction/rectal prolapse/hernia	1.726 (0.561-5.311)	0.340
Duration of surgery	1.003 (1.000-1.005)	0.022*
Open versus minimally invasive	1.250 (0.740-2.111)	0.403
OME first 48 hours	1.001 (1.000-1.001)	0.155
Ileostomy creation	2.179 (1.267-3.748)	0.005*

* $p < 0.05$

DOES PRE-OPERATIVE NARCOTIC TOLERANCE AFFECT THE RESPONSE TO TRANSVERSE ABDOMINIS PLANE (TAP) BLOCKS ADMINISTERED FOR COLON AND RECTAL SURGERY?

P379

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Purpose/Background: Many patients undergoing colon and rectal surgery have pre-existing chronic pain relating to either inflammatory bowel disease (IBD) or cancer, and thus take narcotics regularly. This leads to a tolerance to narcotics, and higher narcotic requirements postoperatively to achieve acceptable analgesia. Narcotics are known to have adverse side effects affecting recovery after colorectal surgery, most specifically nausea, vomiting, and ileus. For this reason, we wanted to assess whether the analgesia provided by transverse abdominis plane (TAP) blocks and alternatives to narcotics results in the same post-operative pain control and narcotic requirements in patients who are tolerant or naïve to narcotics.

Methods/Interventions: This is a retrospective review of patients who underwent TAP blocks for colon and rectal surgery between October 2015 and July 2018 as part of an Enhanced Recovery After Surgery (ERAS) pathway. The main outcomes were total post-operative oral morphine equivalents (OME) and subjective pain scores in the initial 24 hours post-operatively. Univariate analysis was performed using a Student's t-test, and multivariable analysis was performed using linear regression.

Results/Outcome(s): A total of 247 patients were included, with 22.3% of patients who were considered opioid tolerant and 77.7% who were opioid naïve. 24.4% of patients suffered from IBD and 38.2% had cancer. The majority of TAP blocks were performed by an anesthesiologist (76.8%) using exparel and bupivacaine (77.2%).

Alternatives to narcotics were used post-operatively in the majority of patients with 97.2% receiving intravenous acetaminophen, 72.8% receiving celecoxib, 91.5% receiving gabapentin, and 29.3% using ketamine. The mean post-operative pain score was higher in patients who were opioid tolerant (4.9/10) compared to those who were naïve to opioids (4.2/10), ($p=0.0055$). The mean oral morphine equivalents used within the first 24 hours post-operatively was also significantly higher in patients with opioid tolerance compared to opioid naïve patients, (88.1 vs 48.4, respectively; $p<0.0001$).

Conclusions/Discussion: Patients taking routine narcotics prior to colon and rectal surgery experience slightly higher subjective pain and require higher doses of narcotics post-operatively, despite receiving TAP blocks and alternatives to narcotics.

COMPUTERIZED IMAGING FEATURES OF RECTAL WALL AND PERIRECTAL FAT ON T2-WEIGHTED MRI ARE ASSOCIATED WITH COMPLETE PATHOLOGIC TUMOR STAGE REGRESSION AFTER CHEMORADIATION: INITIAL RESULTS.

P380

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Purpose/Background: Accurate evaluation of tumor regression and pathologic response following neoadjuvant chemoradiation therapy (nCRT) is critical for personalized management of patients with locally advanced rectal cancer, including adoption of watch-and-wait protocols. Unfortunately, expert assessment of tumor stage regression on standard-of-care follow-up T2-weighted MRI has only 50-60% accuracy when compared to gold standard pathology; likely due to lack of standardized guidelines and definitive MR imaging traits for tumor response. This challenge is further exacerbated by the presence of fibrosis and inflammation appearing within the rectal wall (location of primary tumor) as well as perirectal fat (surrounding the tumor). This limits the accuracy of using post-CRT T2w MRIs to identify patients with complete pathologic response (i.e. no residual disease, ~25% of all patients) after nCRT, who could avoid unnecessary morbid surgeries and undergo intensive follow-up instead. To overcome limitations of visual inspection, we hypothesized that computer-extracted image texture measurements from MRI (known as radiomic features, which quantify subtle heterogeneity, gradients, and other image-based patterns) of the primary tumor location as well as its surrounding tissue could reflect underlying physiologic changes driven by pathologic tumor regression to nCRT. This preliminary proof-of-concept study sought to evaluate the role of radiomic features of the rectal wall as well as the perirectal

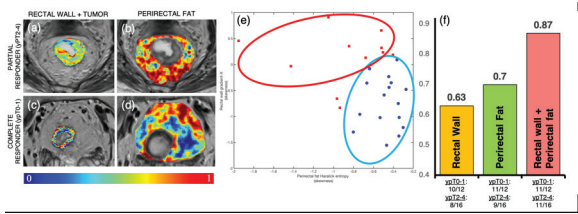
fat on post-CRT T2w MRIs in conjunction with machine learning, for identifying patients with pathologic complete response to nCRT.

Methods/Interventions: This retrospective study included rectal cancer patients seen at an academic institution between 2013 and 2016. Inclusion criteria were: (a) patients underwent nCRT followed by surgery, (b) availability of pre-operative, post-chemoradiation MRI, (c) pathology reports based on surgical specimens, (d) no nodal or distant metastasis. Pathologic response to CRT was defined based on ypT-stage. An expert radiologist annotated the entire rectal wall and surrounding perirectal fat on all post-CRT MRIs, on 3 consecutive slices in an acquisition plane axial through the target regions. 165 radiomic features were calculated from the rectal wall and perirectal fat regions separately. Statistical testing was then used to identify the top radiomic features associated with pathologic complete response, for the rectal wall and fat separately. A machine learning classifier was used to assess the ability of different radiomic feature sets to predict pathologic response to CRT, with cross-validation to ensure robustness: (a) rectal wall features, (b) perirectal fat features, (c) combined rectal wall and fat features. Model performance was evaluated using ROC analysis, including sensitivity and specificity.

Results/Outcome(s): A total of 28 patients were included in this study where 12 patients were assessed as complete/near-complete response to nCRT (ypT0-1), with the remaining 16 being ypT2-4. The best overall performance for identifying both complete (11/12, 92%) and incomplete responders (11/16, 69%) to nCRT was obtained via the combination of rectal wall and perirectal fat radiomic features, with $AUC = 0.87$. By comparison, rectal wall radiomic features alone achieved an $AUC=0.63$ while perirectal fat radiomic features alone yielded $AUC = 0.70$. The combined feature set had an equal proportion of radiomic features from the rectal wall and perirectal fat, with the top ranked features being: (a) difference variance of intensities within perirectal fat ($p=0.0037$), (b) wave-spot intensity gradient patterns within rectal wall ($p=0.0148$).

Conclusions/Discussion: Computerized imaging (radiomic) features from both the rectal wall and perirectal fat appear to exhibit textural characteristics associated with pathologic complete response (ypT0-1) after chemoradiation on MRI. To our knowledge, this is the first study to demonstrate that the surrounding perirectal fat may have complementary textural information to the primary tumor location for evaluating pathologic response to nCRT. This suggests that the impact of chemoradiation may be observed in both the rectal wall and perirectal fat, as a result of which integrating radiomic features from both regions yielded the most sensitive and specific identification of pathologic complete responders to chemoradiation, via post-nCRT MRI. Further validation of the underlying

pathologic and physiologic basis for these radiomic signatures in different tissue regions is underway.



Pixel-wise heatmaps of top-ranked computerized imaging features depicting increased radiomic heterogeneity (more red regions) in (a) rectal wall/tumor and (b) perirectal fat in a patient with partial response (ypT3) to nCRT compared to (c), (d) patient with significant tumor regression after nCRT (ypT1). (e) 2D scatter plot with top-ranked perirectal fat radiomic feature on X-axis and top-ranked rectal wall radiomic feature on Y-axis showing excellent discrimination between non-responders (red) and near-complete responders (blue) to nCRT. (f) AUCs for predicting complete responders to nCRT based on radiomic features from different regions within and proximal to the primary rectal tumor location on post-CRT T2w MRI.

LICOCHALCONE A SUPPRESSES COLORECTAL CANCER CELL METASTASIS CAPACITY VIA DOWNREGULATION OF MKK4/JNK.

P381

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Purpose/Background: Colorectal cancer (CRC) is the second prevalent cancer around the world. Almost half of these patients eventually developed recurrence and metastasis leading to death within 5 years of diagnosis. Licochalcone A (LicA) had been proved to be effective in anti-microbial, anti-inflammatory and anti-tumor directions. However, the effects of LicA on human CRC cells have not yet been well revealed.

Methods/Interventions: Cell viability was determined by MTT assay. Apoptosis was assessed using Annexin V staining and flow cytometric analysis. All the protein alterations were examined by Western blotting and the blots were quantified by Image J software. The migratory and invasive capacities were determined by wound-healing assay and Matrigel™ invasion assay, respectively. Differences between groups will be determined by two-sided Student's *t*-test and any value of $P < 0.05$ was considered statistically significant.

Results/Outcome(s): Our results indicated that LicA did not inhibit the viability or induce the apoptosis of HT29 and LOVO CRC cells significantly. Interestingly, LicA inhibited the migratory and invasive capacities of LOVO cells dose-dependently. At the same time, it was found that LicA inhibited the expression of uPA dose-dependently in LOVO cells. In addition, LicA also inhibited the expression of phosphor-JNK and phosphor-MKK4, but not their intact forms in LOVO cells. Last, LicA decreased

uPA levels in SP600125-treated or si-MKK4-transfected LOVO cells alongside a significant reduction in the migration and invasion of LOVO cells, which supported the idea that the inhibition of MKK4/JNK axis would lead to anti-metastatic consequences.

Conclusions/Discussion: These novel findings extend the understanding of the efficacy for LicA in suppressing the metastasis of CRC cells and the underlying signaling network, as well as propose LicA to serve as an anti-metastatic agent in CRC clinical practice in the near future.

BILATERAL GLUTEAL FASCIOCUTANEOUS ADVANCEMENT FLAPS WITH AND WITHOUT COMPRESSING TIE-OVER SUTURES IN TREATMENT OF RECURRENT PILONIDAL DISEASE.

P382

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Purpose/Background: Patients with complex and recurrent pilonidal disease may undergo various flap-based procedures to reconstruct the post-excision wound defect. Regardless of approach, dehiscence and recurrence occur in up to 50% of patients and cosmetic results are subpar. We present an outpatient, durable and cosmetic approach to reconstruction via bilateral gluteal fasciocutaneous flaps with and without compressing tie-over sutures.

Methods/Interventions: This is a retrospective review of a prospective database. Following excision of pilonidal disease, gluteal fasciocutaneous advancement flaps are elevated using blunt discontinuous dissection in a 360-degree fashion to allow a tension-free repair. A multilayered tension-free closure is then performed using interrupted sutures, starting at the fascial level with careful attention to evert the skin edges. For the 12 most recent patients, two full thickness compressing sutures tied over a rolled up gauze were placed at the lower end of the incision. The resulting scar is mid-line.

Results/Outcome(s): Twenty-eight patients, 3 females, with average BMI of 27.7 kg/m² and mean age of 30.3 years were studied. Five patients were current smokers and 8 had a BMI greater than 30 kg/m². At a median follow-up of 21 months (range 2-55 months), there were no recurrences. Eleven (39%) patients had wound dehiscence: 8 (50%) of the first 16 without compressing tie-over sutures, and only 3 (25%) of the last 12 patients with compressing tie-over sutures. Four of 5 (80%) smokers and 3 of 7 (43%) obese patients had wound dehiscence. All dehiscence resolved with office hair shaving and wound care.

Conclusions/Discussion: Bilateral gluteal fasciocutaneous advancement flap closure is an effective, cosmetic, and durable outpatient treatment for recurrent and complex pilonidal disease. Patients had no recurrence, and

lower dehiscence rate and less visible scars than commonly used procedures. Use of compressing tie-over sutures appears to further decrease dehiscence.



Intraoperative Photo of Compressing Tie-over Sutures with Gauze

PERIOPERATIVE AND FUNCTIONAL OUTCOMES AFTER RECTAL PROLAPSE SURGERY – A SINGLE INSTITUTION EXPERIENCE OF MULTIPLE SURGICAL PROCEDURES.

P383

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Purpose/Background: Full thickness rectal prolapse is a debilitating condition that can adversely affect quality of life. The paradigm for the optimal surgical treatment of rectal prolapse is shifting. Classically, surgeons advocated for elderly patients to undergo a perineal approach while reserving abdominal approaches for non-elderly patients. As technology and techniques have improved, more patients have become eligible for an abdominal approach. This study assesses a single institution's experience with various abdominal and perineal approaches to rectal prolapse, and examines the clinical and functional outcomes of these surgeries.

Methods/Interventions: Through a single-institution, retrospective surgical database, clinical and patient-reported functional outcomes were analyzed for all patients who underwent a curative operation for rectal prolapse between 2006 and 2018. Surgical procedures were divided into perineal procedures (PP, Altemeier or Delorme

procedures), posterior rectopexy (PR, posterior mesh or suture rectopexy), resection rectopexy (RR), and ventral rectopexy (VR, with or without sacral colpopexy). We analyzed the patient's demographics and perioperative outcomes, including ASA levels, Clavien-Dindo classification grade ≥ 2 , hospital length of stay, rectal prolapse recurrence (RPR) rates, and outcomes of subsequent redo operations. Data was analyzed using Kruskal-Wallis and logistic regression using SPSS software; a p value < 0.05 was considered significant. In addition, patients were interviewed over the telephone using a standardized IRB-approved questionnaire, and asked to describe their preoperative and postoperative functional status, symptomatic recurrence of rectal or pelvic organ prolapse (POP), overall postoperative satisfaction (via 7 point Likert scale), constipation (as graded by the Rome IV constipation score), and fecal incontinence (as graded by the Fecal Incontinence Severity Score).

Results/Outcome(s): Patient demographics, clinical outcomes, and functional outcomes are shown in Table 1. Over 13 years, 52 perineal procedures (PP), 51 resection rectopexies (RR), 26 posterior rectopexies (PR) and 56 ventral rectopexies (VR) have been performed. Patients undergoing PP were significantly older and had higher median ASA scores (both $p < 0.001$) than those who underwent RR, PR or VR. The mean length of stay was significantly shorter for VR patients (0.89 versus 3.45 days, $p < 0.001$). The rate of serious perioperative complications was also lowest for the VR patients (Clavien-Dindo grade ≥ 2 1.8 versus 16.3%, $p < 0.05$ versus PP and RR). Consistent with the literature, RPR was significantly more likely after PP than abdominal approaches (RPR after initial operation, 50% versus 12.6%, $p < 0.001$; RPR after redo 55% versus 23%, $p = \text{NS}$). RPR after an initial abdominal operation was least frequent after PR and VR (5.3% and 9.5%), followed by RR (18%). After a redo operation, recurrent RPR was noted in 11/14 PP patients (79%), 1/1 RR patients (100%), 5/7 PR patients (84%), but only 4/13 VR patients (31%, $p = \text{NS}$). Two RPR after initial RR and 1 after re-do PR were in fact enteroceles that prolapsed through the anal canal, and were addressed with VR. During telephone interview, we achieved a response rate of 74% with mean follow-up of 55.0 months from the patient's last operation, although follow-up was shorter in the VR group (18.1 months). Postoperative patient satisfaction was highest in the VR group, with 81.4% of patients reporting that they were better than before surgery, and lowest in the PP group (66.7% better off). Compared with the other groups, more RR patients reported postoperative constipation (Rome IV score ≥ 2 , 35%), incontinence (FISS > 10 , 36%) and POP (19%). The PR patients had the lowest rate of reported RPR (2/12, 17%) and 0/12 PR patients reported bothersome constipation (0%). The VR group reported the lowest rates of incontinence (FISS > 10 , 16%) and pelvic organ prolapse (4.7%).

Conclusions/Discussion: Choosing the optimal treatment for rectal prolapse can be difficult, in part due to the wide variety of described procedures and the relative inexperience with prolapse for most clinicians. This study demonstrates that VR and PR are better initial approaches to prolapse than PP or RR, based on superior surgical durability, postoperative functional outcomes, and patient satisfaction. In the setting of a redo operation, however, VR appears to be the optimal approach given lower re-recurrence rates and perioperative outcomes.

	Total	Perineal Procedure	Resection Rectopexy	Posterior Rectopexy	Ventral Rectopexy	
Patient Demographics	Number of Patients	185	52	51	26	56
	Mean Age (Range)	69.3 (20-96)	81.8 ^a (65-96)	60.6 (20-82)	72.0 (57-88)	64.3 (25-94)
	Median ASA	2	3 ^b	2	2	2
	Mean Length of Stay (Range)	2.69 (0-16)	2.55 (0-16)	4.35 (2-22)	3.47 (0-19)	0.89 ^a (0-6)
	Clavien-Dindo ≥2 (%)	22 (11.9%)	7 (17.5%)	11 (21.2%)	3 (15.8%)	1 (1.8%)
	OR	8.7	11.0	7.7	Ref	
	Logistic Regression (p value)		(0.048)	(0.025)	(0.087)	Ref
Operations and Recurrence	Initial Operation	149	38	50	19	42
	1 st Recurrence (%)	33 (22.1%)	19 (50.0%)	9 (18.0%)	1 (5.3%)	4 (9.5%)
	OR	8.8	<(0.001)	(NS)	(NS)	Ref
	Logistic Regression (p value)					Ref
	Redo Operation	35	14	1	7	13
	2 nd Recurrence (%)	21 (60.0%)	11 (78.6%)	1 (100%)	5 (71.4%)	4 (30.8%)
	OR	8.3	7.8	(NS)	(NS)	Ref
Logistic Regression (p value)		(0.017)	(NS)	(NS)	Ref	
Functional Outcomes	Number of Patients Alive for Survey	130	17	41	19	53
	Number of Respondents (%)	96 (73.8%)	12 (70.6%)	29 (70.7%)	12 (63.2%)	43 (81.1%)
	Mean Follow-up (months)	55.0	45.4	86.8	70.7	18.1
	Reported Recurrence (%)	27 (28.1%)	4 (33.3%)	10 (34.5%)	2 (16.7%)	11 (25.6%)
	Reported Improved Status (%)	74 (77.1%)	8 (66.7%)	22 (75.9%)	9 (75.0%)	35 (81.4%)
	Constipation Rome IV Score ≥2 (%)	18 (18.8%)	3 (25.0%)	10 (34.5%)	0 (0%)	7 (16.3%)
	FISS > 10 (%)	20 (20.8%)	3 (25.0%)	10 (35.7%)	3 (25.0%)	7 (16.3%)
	Reported Pelvic Organ Prolapse (%)	10 (10.4%)	2 (16.7%)	5 (18.5%)	1 (8.3%)	2 (5.0%)
	^a by ANOVA (p < 0.001)					
	^b by Kruskal-Wallis (p < 0.001)					

Perioperative Outcomes for Rectal Prolapse Surgery and Postoperative Patient Reported Functional Outcomes

PRELIMINARY RESULTS OF A PHASE II CLINICAL TRIAL: TOTAL NEOADJUVANT THERAPY FACILITATES ORGAN PRESERVATION FOR PATIENTS DIAGNOSED WITH LOCALLY ADVANCED RECTAL CANCER.

P384

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Purpose/Background: We aim to conduct phase II clinical trial to evaluate the feasibility of achieving organ preservation in patients diagnosed with locally advanced rectal cancer (LARC) (T3, N0-1). All patients received total neoadjuvant therapy (TNT) with the goal of improving the tumor pathological response and to increase the rate of organ preservation.

Methods/Interventions: The study population consisted of eleven patients enrolled in our ongoing phase II clinical trial aiming to evaluate the utility of full-thickness local excision for patients diagnosed with LARC, whose tumors exhibited complete clinical response following TNT. Nine

patients completed the planned treatment goals and their data are available for this analysis. All patients received 6 cycles of FOLFOX chemotherapy and after three weeks rest, a conventional course of chemoradiotherapy was added. The radiation therapy dose ranged between 45 and 54 Gy depending on the tumor response to the induction chemotherapy. Evaluation of the tumor clinical response was determined by the digital rectal exam, flexible sigmoidoscopy and endoscopic ultrasound examination as well as MRI. Patients with tumors deemed to be in complete clinical response underwent full-thickness local excision. Other patients underwent total mesorectal excision surgery (TME).

Results/Outcome(s): The duration between completion of radiation therapy and surgery ranged between 7-13 weeks with a median value of 8 weeks. The complete pathological response rate was achieved in 4/9 (44%). Three of nine (33%) patients had full-thickness local excision. The fourth patient had a low anterior resection surgery (LAR) as his tumor was falsely thought to have residual disease at the time of pre-surgery clinical evaluation. Two patients had undergone full-thickness local excision and were advised to undergo completion TME surgery because of the presence of microscopic residual disease. One of those patients underwent abdominoperineal resection (APR) and the other patient refused any further surgery. Three patients had undergone TME after completion of TNT (2 patients had LAR and the third patient had APR). Currently, there are two patients in the trial who achieved complete clinical response after induction chemotherapy and waiting for full-thickness local excision.

Conclusions/Discussion: This study suggests that adding only six cycles of neoadjuvant FOLFOX before CRT improved pathological downstaging of LARC and facilitated organ preservation surgery. This strategy needs to be investigated in a larger phase III trial to validate these findings.

SYSTEMATIC REVIEW AND META-ANALYSIS OF LOCAL VERSUS RADICAL SURGERY FOR EARLY RECTAL CANCER WITH OR WITHOUT NEOADJUVANT OR ADJUVANT THERAPY.

P385

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Purpose/Background: Total mesorectal excision (TME) is the standard of care for stage I rectal cancer. Despite major advances and increasing enthusiasm for modern local excision (LE) using endoscopic techniques, there is uncertainty regarding its oncologic equivalence to radical resection (RR). A systematic review of the literature and meta-analysis of high-quality evidence was conducted to compare the safety and effectiveness of these techniques.

Methods/Interventions: We used the Cochrane Collaboration methodology for this review. We searched the Cochrane Central Register of Controlled Trials,

MEDLINE, EMBASE, Science Citation Index, and a wide range of grey literature for published and unpublished randomized controlled trials (RCT), comparing modern LE techniques to RR in patients with stage I rectal cancer. No publication year or language restriction was applied. Our primary outcomes were disease-free survival (D-FS) and sphincter function. Our secondary outcomes were overall survival (OS), local recurrence, major and minor postoperative complications (Clavien-Dindo classification), and 30-day postoperative mortality. Risk of bias (RoB) was evaluated according to the Cochrane RoB tool and heterogeneity was assessed using forest plots, chi-squared test, and I^2 statistic before pooling the results within Mantel-Haenszel random-effects or Peto-odds ratio (OR) models for event rates <10%. RevMan 5.3 software was used to calculate hazard ratios (HR) and 95% confidence intervals (95%CI) for time-to-event data. Parmar and Tierney's methods were used to maximize data extraction from reports with incomplete outcome reporting.

Results/Outcome(s): Review of the literature until August 2018 identified 17 eligible reports of 5 studies among 5951 titles screened by two independent reviewers and adjudicated by the third reviewer. After full-text review, 3 RCTs served as the main sources for data extraction. One ongoing RCT was flagged for future updates and a second RCT contained a mixed group of T2-T3N0M0 patients and was classified as awaiting assessment for future data extraction upon availability. All three RCTs had at least one domain with high RoB. Overall, the three RCTs reported on 211 stage I rectal cancer patients without high-risk pathological features and tumor size < 3-4cm randomized to LE or RR. Patients in both arms may or may not have received neoadjuvant chemoradiotherapy. One RCT reported 89% vs. 94% cancer-related survival at 10 years for LE and RR and another RCT reported an overall survival of 96% at 5 years for both groups. However, there was no statistical difference between LE and RR for D-FS (HR 1.56, 95%CI 0.57-4.31, 3 studies/211 patients), OS (HR 1.26, 95%CI 0.50-3.12, 2 studies/153 patients), and local recurrence rates at 1 year (OR 1.90, 95%CI 0.64-5.64; 2 studies/111 patients). None of the studies reported quantitative results for sphincter function. No perioperative or 30-day mortality was reported in any of the studies. Results for major and minor postoperative complications were not pooled due to high heterogeneity ($I^2 = 55\%$). Overall quality of evidence for primary outcomes was deemed as low according to the GRADE Working Group framework.

Conclusions/Discussion: This review suggests that there is no difference between LE and RR regarding oncologic and operative outcomes in patients with early-stage rectal cancer. However, the quality of evidence is low because of the low number of patients, high RoB, and a high level of heterogeneity. More RCTs are required to assess whether LE is equivalent to RR in rectal cancer treatment.

SURGICAL PROFICIENCY ANALYZED BY RISK ADJUSTED CUMULATIVE SUM (RA-CUSUM) WITH SURGICAL OUTCOMES BASED ON 506 CASES OF ROBOTIC SURGERY FOR RECTAL CANCER BY A SINGLE SURGEON.

P386

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Purpose/Background: Previous studies have analyzed acquiring proficiency in robotic surgical resection for rectal cancer with surgical duration. To the best of our knowledge, there was no study to demonstrate differences in postoperative morbidity or pathologic outcomes according to learning phases. We investigated whether there are differences in surgical outcomes, as a single surgeon builds up his surgical experiences for 11 years.

Methods/Interventions: We identified a total of 506 consecutive rectal adenocarcinoma patients between 2007 and 2018 who underwent robotic total mesorectal excision (TME) by a single laparoscopic expert surgeon at Severance hospital, Seoul, Korea. The cumulative sum (CUSUM) method with surgical duration and risk-adjusted CUSUM (RA-CUSUM) with surgical failure were used to analyze learning curve. For RA-CUSUM, surgical failure was defined as anyone of follows: open conversion, Clavien-Dindo classification ≥ 3 ($CD \geq 3$), <12 harvested lymph nodes (LN), R1 resection (Circumferential resection margin [CRM] ≤ 1 mm or Distal resection margin = 0mm), and local recurrence.

Results/Outcome(s): CUSUM analysis with surgical duration reveals two peak points at the 36th and 133th cases. According to the RA-CUSUM, the learning phase was divided into three phases: phase 1 [initial learning period (1st-34th case), n=34], phase 2 [challenging period (35st-182th case), n=148], and phase 3 [competent period (183st-506th case), n=324]. Phase 2,3 were associated with lesser depth of tumor invasion in pathology, higher rate of ultralow anterior resection, and preoperative radiotherapy, which reflect the advanced tumor status, compared to phase 1. Only 4 cases of open conversion were noted in phase 1. The Phase 3 showed similar surgical duration (phase 2: 345 vs. phase 3: 337 min.; $P=0.835$), CRM involvement rate (phase 2: 4.4% vs. phase 3: 7.5%; $P=0.554$), and local recurrence rate (phase 2: 5.4% vs. phase 3: 3.0%; $P=0.672$), compared to phase 2. Otherwise, proximal resection margin (phase 2: 12.0cm vs. phase 3: 14.0cm; $P=0.001$), rate of number of harvested LN <12 (phase 2: 36.8% vs. phase 3: 28.6%; $P=0.04$), $CD \geq 3$ (phase 2: 10.3% vs. phase 3: 4.5%; $P=0.038$) and length of hospital stay (phase 2: 9 days vs. phase 3: 7 days; $P=0.001$) were significantly different between two groups.

Conclusions/Discussion: Based on consecutive 506 cases of robotic surgery by single laparoscopic expert surgeon, number of cases reaching to surgical proficiency with respect to surgical outcome could be differ from

those of learning curve analyzed by with operation time in patients underwent for robotic surgery for rectal cancer (n=182, n=133, respectively). Therefore surgeon should make an effort to improve the surgical outcome after attaining full adaptation to the use of instrument.

ANALYSIS OF INDOCYANINE GREEN FLUORESCENCE IMAGING FOR EVALUATION OF COLONIC PERFUSION IN LAPAROSCOPIC COLORECTAL SURGERY.

P387

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Purpose/Background: The aim of this pilot study is to evaluate to association between time of indocyanine green (ICG) fluorescence uptake and anastomosis leakage.

Methods/Interventions: this retrospective analysis of database of 41 patients who performed ICG perfusion test of 147 patients who underwent surgical resection of colorectal cancers from January to August, 2018 in a single institute. After the specimen was extracted extracorporeally, planned mesentery and marginal vessels were ligated, and then 5mg of ICG was injected. ICG fluorescence image recording was performed on the well-perfusion area, while initial blood pressure, initial ICG uptake time (T_{ini}), and maximum ICG uptake time (T_{max}) were measured.

Results/Outcome(s): There was no anastomosis leakage (AL) within postoperative 30 days, but 1 ischemic colitis in proximal colon after anterior resection was observed (T_{ini}; 33sec, T_{max}; 42 sec). Mean age was 68.7 ± 10, 22 male patients (53.7%) was involved. 11 right hemicolectomies (26.8%), 19 anterior resections (46.3%), 11 low anterior resections (26.8%) were performed. Mean initial ICG uptake time (T_{ini}) was 34.2 ± 8.9 sec (17 – 51 sec), mean maximal ICG uptake time (T_{max}) was 45.7 ± 13.1

sec (24 – 71 sec) and mean time of duration full uptake (T_{dur}), which was defined as T_{ini} subtracted from T_{max}, was 11.5 ± 6.2sec (4 – 30). There were no significant differences of 3 time values between right colectomy (n=11) and left colectomy (n=31).

Conclusions/Discussion: Quantitative values, such as ICG uptake times and signal intensity of ICG uptake were needed for an accurate assessment of perfusion of colon surgery. Therefore, this pilot study plans to conduct quantitative measure on image pixel as well as ICG uptake time.

Table 1. Baseline patient, tumor and time of ICG uptake characteristics

Characteristics	No. of patients (N=41)
Age (year)	68.7 ± 10.0
Male	22 (53.7)
BMI (kg/m ²)	24.6 ± 3.3 (17.7 – 31.4)
HTN / DM / CVA / CKD	22 / 10 / 2 / 1
Tumor location	
Right colon cancer	11 (26.8)
Left colorectal cancer	30 (73.2)
Left colon / Rectum	21 / 9
Operation type	
Lap RHC	11 (26.8)
Lap AR	19 (46.3)
Lap LAR w/c ileostomy *	11 (26.8)
AJCC - Stage	
Tis / I / II	1 (2.4) / 14 (34.1) / 7 (17.1)
III / IV	18 (43.9) / 1 (2.4)
T _{initial} uptake (sec)	34.2 ± 8.9 (17 - 51)
T _{maximum} uptake (sec)	45.7 ± 13.1 (24 - 71)
T _{duration} of full uptake(sec)	11.5 ± 6.2 (4 - 30)
Systolic blood pressure (mmHg)	95.9 ± 12.0 (67 - 120)
Diastolic blood pressure (mmHg)	64.0 ± 11.4 (40 - 94)
Mean arterial pressure (mmHg)	74.6 ± 11.0 (52 - 103)
Postoperative hospital stay (day)	7.27 ± 1.0 (5 - 11)
Anastomosis leakage (<30 day)	0

HTN, hypertension; DM, diabetes mellitus; CVA, cerebrovascular accident; CKD, chronic kidney disease; RHC, right hemicolectomy; AR, anterior resection; LAR, low anterior resection; AJCC, American Joint Committee on Cancer

*including 8 patients who underwent preoperative chemoradiotherapy

P386 Perioperative outcomes compared by learning phases determined by RA-CUSUM analysis

	Phase 1 (n=34)	Phase 2 (n=148)	Phase 3 (n=324)	P value
Surgical duration, median (Q1-Q3), min	405 (345-367)	345 (303-420)	337 (291-391)	0.0001
Blood loss, median (Q1-Q3), ml	205 (36-425)	150 (20-300)	110 (50-300)	0.584
Open conversion, n (%)	4 (11.8)	0 (0.0)	0 (0.0)	0.0001
PRM, median (Q1-Q3), cm	10.1 (8.3-12.0)	12.0 (9.5-15.0)	14.0 (10.7-17.0)	0.0001
DRM, median (Q1-Q3), cm	2.5 (1.5-4.0)	2.0 (0.8-3.5)	2.0 (1.0-3.0)	0.021
CRM involvement, n (%)	3 (8.8)	9 (4.4)	20 (7.5)	0.332
Examined LN<12	13 (38.2)	75 (36.8)	66 (24.6)	0.011
30 days morbidity, n (%)	10 (29.4)	52 (25.5)	65 (24.3)	0.805
30 days mortality, n (%)	0 (0.0)	0 (0.0)	2 (0.5)	0.699
Clavien-Dindo classification ≥3, n (%)	4 (11.8)	21 (10.3)	12 (4.5)	0.033
Hospital stay (Q1-Q3), day	10 (9-13)	9 (7-11)	7 (7-9)	0.0001
Adjuvant chemotherapy, n (%)	21 (61.8)	123 (60.3)	194 (72.4)	0.018
Local failure, n (%)	1 (2.9)	11 (5.4)	8 (3.0)	0.393

Abbreviations: PRM, Proximal resection margin; DRM, Distal resection margin; CRM, Circumferential resection margin; LN, lymph node

EXTRAMURAL VASCULAR INVASION ON MRI AS A SURROGATE FOR HIGH RISK RECTAL CANCER IS PREDICTIVE OF OVERALL RECURRENCE.

P388

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Purpose/Background: Extramural Vascular Invasion (EMVI) identified by MRI is understood to be a poor prognostic factor; however, reporting of this finding is not standardized and the presence of EMVI is not a formal indication for treatment strategies that address a high-risk of systemic disease. We hypothesize that EMVI confers a high risk of recurrence and this finding can inform treatment strategies for high-risk lesions.

Methods/Interventions: This is a retrospective review of all rectal cancer patients treated with curative intent in a single institution from January 2013 to October 2017. Chart abstraction was performed to identify episodes of recurrence as well as patient characteristics, radiology variables and pathology variables. Logistic regression analysis was performed in two models to identify risk for recurrence. Univariate and multivariate logistic regression models were performed to determine the association between recurrence and the predictor of interest. Due to incomplete reporting of all predictive variables, two models were performed to account for small sample size.

Results/Outcome(s): 183 patients were included in the analysis. Thirty six patients developed recurrence for a rate of 19.7% (13 local, 20 distant, 3 local and distant). Median follow-up was 514 days (IQR 173-739 days). The presence of EMVI on either pre- or post-treatment staging MRI was predictive of overall recurrence OR 7.20 (95CI 1.94-26.6, $p < 0.01$). Additional predictors that approached significance for overall recurrence include low Tumor Regression Grade on pathology OR 3.47 (95CI 0.96-12.50, $p = 0.06$) and positive pre- or post-treatment MRI circumferential resection margin (CRM) OR 3.13 (95CI 0.84-11.68, $p = 0.09$).

Conclusions/Discussion: Patients that demonstrate pre- or post-treatment MRI EMVI are at almost 7-fold risk of overall recurrence. For patients with this finding, consideration should be given to a treatment approach that employs neoadjuvant systemic chemotherapy prior to standard radiation in order to address the more pressing risk of systemic disease. To add, reporting of this strong prognostic feature was inconsistent in our review, emphasizing the importance of standardized reporting of rectal cancer protocol MRIs.

WAITING >3 MONTHS BETWEEN RADIATION AND SALVAGE APR IS ASSOCIATED WITH POSITIVE MARGINS IN PATIENTS WITH ANAL CANCER TREATED WITH CONCURRENT CHEMORADIATION.

P389

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Purpose/Background: There is significant controversy regarding the optimal time to assess anal squamous cell carcinoma (SCC) response to chemoradiation and when salvage abdominoperineal resection (APR) should be performed. Current NCCN guidelines for anal SCC recommend assessing patients with digital rectal exam 2-3 months after chemoradiation, with consideration of APR if disease persists at 6 months. However, we propose that these longer post-chemoradiation surveillance times are not appropriate for all patients. In this study, we analyzed the effect of increased time between completion of chemoradiation and salvage APR on postoperative outcomes in patients with anal SCC.

Methods/Interventions: We identified patients with stage I-III anal SCC treated with concurrent chemoradiation who subsequently underwent APR as captured by the National Cancer Database (1/2004 through 12/2015). First, we identified risk factors for failed primary chemoradiation and need for salvage APR. Next, we evaluated outcomes of post-resection margin status, pathologic upstaging of T stage, and overall survival. Then, we constructed logistic regression models and Cox proportional hazards analyses to determine factors associated with poor outcomes and overall survival.

Results/Outcome(s): We identified 23,050 patients with stage I-III anal SCC treated with concurrent chemoradiation, of whom 545 (2.4%) subsequently underwent APR. There was no association between HPV 16 and/or 18 positivity and need for salvage APR ($p = 0.5$). Predictors of salvage APR after chemoradiation included male sex (OR 1.43, 95% CI 1.13-1.83) and tumor size > 5 cm (OR 8.20, 95% CI 4.22-15.93). Focusing on the 545 patients who underwent APR, the median (IQR) time between completion of radiation and APR was 3.8 (2.4-5.5) months. The rate of positive resection margins was 19.0% and lymphovascular invasion was 17.9%, while multivisceral resection was performed in 11.3% and positive nodes were identified in 16.5%. The T stage was pathologically upstaged in 13.3% of patients despite chemoradiation. Overall survival at 1- and 5-years was 86.8% and 42.3%, respectively. Positive margins were more common in patients with male sex ($p = 0.02$), non-white race ($p = 0.04$), larger tumors ($p = 0.02$), pathologic upstaging of T stage ($p = 0.01$), and > 3 months between end of chemoradiation and APR ($p < 0.001$). On multivariable analysis, waiting > 3 months between completion of chemoradiation and APR was

a predictor of positive margins, even after adjusting for tumor size and other patient factors (OR 2.56, 95% CI 1.46-4.47). On Cox regression, predictors of increased mortality were male sex (HR 2.50, 95% CI 1.45-4.29), positive margins (HR 2.35, 95% CI 1.29-4.31), and pathologic upstaging of T stage (HR 2.19, 95% CI 1.16-4.13).

Conclusions/Discussion: In the largest published cohort of patients who underwent salvage APR for anal SCC after prior treatment with chemoradiation, we identified positive margins in 19.0%, T stage pathologic upstaging in 13.3%, need for multivisceral resection in 11.3%, and a 5-year overall survival of 42.3%. Men with larger tumors were at increased risk of undergoing salvage APR. Waiting >3 months between completion of chemoradiation and salvage APR was associated with an increased risk of positive margins, even after adjusting for pre-treatment tumor size. Our data suggest that when salvage APR is necessary, current NCCN guidelines for surveillance and surgical salvage may lead to poor outcomes in high-risk patients, particularly non-white men with tumors >2 cm in size. We suggest alternative surveillance protocols with early interim restaging in these high-risk patients.

Table 1. Characteristics of patients with anal SCC treated with concurrent chemoradiation and subsequent salvage APR, based on margin status.

Characteristic	Negative margins (n=427)	Positive margins (n=100)	P-value
Age at diagnosis ≥65 years old	118 (27.6%)	24 (24.0%)	0.46
Male sex	168 (39.3%)	52 (52.0%)	0.02
White race	383 (90.8%)	83 (83.8%)	0.04
Charlson/Deyo score ≥1	94 (22.0%)	26 (26.0%)	0.39
Tumor size			0.02
≤2 cm	35 (9.8%)	1 (1.1%)	
>2 but ≤5 cm	171 (47.9%)	42 (46.7%)	
>5 cm	151 (42.3%)	47 (52.2%)	
Poorly or undifferentiated tumor grade	132 (37.2%)	35 (41.7%)	0.72
Clinical stage			0.27
Clinical stage 1	20 (5.7%)	1 (1.3%)	
Clinical stage 2	141 (39.9%)	33 (42.9%)	
Clinical stage 3	192 (54.4%)	43 (55.8%)	
>3 months between end of chemoradiation and APR	249 (58.3%)	78 (78.0%)	<0.001
Multivisceral resection	46 (10.8%)	14 (14.1%)	0.35
T stage pathologically upstaged	28 (11.0%)	14 (23.0%)	0.01
Lymphovascular invasion present	33 (15.1%)	19 (30.7%)	0.02
Positive regional nodes	66 (15.5%)	22 (22.2%)	0.27
90-day mortality	17 (4.4%)	13 (15.7%)	<0.001
1-year overall survival (%; 95% CI)	88.8% (85.2-91.6%)	75.9% (65.2-83.7%)	<0.001
5-year overall survival (%; 95% CI)	48.0% (42.5-53.3%)	15.3% (8.0-24.9%)	

UNPLANNED CONVERSIONS FROM ROBOTIC AND LAPAROSCOPIC COLECTOMY IN PATIENTS WITH COLON CANCER ARE ASSOCIATED WITH WORSE OUTCOMES: IDENTIFYING KEY FACTORS FROM NSQIP.

P390

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Purpose/Background: Robotic and laparoscopic colectomies for colon cancer have potential benefits to patients such as shorter length of stay and less morbidity. Laparoscopic and robotic colectomy for colon cancer still requires conversion to an open colectomy in 10.8% and 6.8% of patients

respectively. Unplanned conversions have associated risks, with increased length of surgery and worse patient outcomes. Using the prospectively-collected, retrospectively-reviewed NSQIP database, we evaluated outcomes of robotic and laparoscopic colectomies for colon cancer compared with open colectomies. The goals of this study were to (1) compare the outcomes of patients that undergo conversion from robotic or laparoscopic colectomy to open versus patients who undergo planned open colectomy for colon cancer and (2) to build a predictive model to identify preoperative risk factors associated with unplanned conversion.

Methods/Interventions: The procedure-targeted NSQIP data from 2014-2016 for colectomy was colon cancer. Robotic and laparoscopic cases that underwent an unplanned conversion were selected and case matched with planned open according to a 1:1:1 ratio controlling for gender, age, weight, probability of morbidity, T stage, ASA classification, and Wound class. Quantitative variables were compared using the Kruskal-Wallis test, while categorical variables were compared using the chi-squared test. Preoperative variables were statistically the same. When analyzing the outcomes data, continuous fields such as length of stay and operation time were compared with a linear regression with a log transformation. Categorical outcomes fields were compared with a logistic regression model. The predictive model was created from the full colon cancer surgery dataset. A flag target variable was created for determining if an unplanned conversion took place. The data was partitioned into two groups: 75% training, 25% testing. These variables are then tested for autocorrelation and broken down into sets of independent variables. Predictive models were built with random forests, neural nets, CHAID, and Quest models. The resulting models were modified through boosting and bagging and the weight of type 1 and type 2 errors adjusted. The best model was a boosted CHAID model with a 200% penalty on type 2 errors.

Results/Outcome(s): 32,321 patients underwent colectomy for colon cancer (3,219-robotic; 20,191-laparoscopic, 8911-planned open). 225 had unplanned conversions from robotic colectomy and 2,190 from laparoscopic colectomy. 204 patients were case matched. A univariate comparison showed that planned open surgery has better results in nearly all outcomes metrics. Operation time and length of stay were shorter (p = .00001, p = .0046), there were fewer SSIs and ileus (p = .019, p = .022), and return to OR percentage and readmission percentages were lower (p = .004, p = .007). Risk factors for unplanned conversions were identified and a predictive model was built. There were 14 strongly correlated variables (p < .05). These were then tested for autocorrelation and put into the model building algorithms. The predictive model selected wound classification, T stage, increased weight, and diabetes as the most important predictors of an unplanned conversion.

Conclusions/Discussion: Both robotic and laparoscopic colectomies have risk of conversion to open colectomy. It appears that unplanned conversions from a robotic or laparoscopic colectomy have worse outcomes than those

who undergo a planned open colectomy for colon cancer. The planned open group had significantly shorter length of stay, operation time as well as lower rates of SSI, return to the OR, and readmission. Given the morbidity of unplanned conversions, a planned open colectomy would be ideal for patients at risk for conversion from robotic or laparoscopic colectomy. A predictive model was then built to identify risk factors associated with unplanned conversions. The model found wound classification, T stage, and diabetes to be the best predictors of unplanned conversion. If lower T-stage is predicted based of preoperative workup then patients are less likely to require conversion. Many other factors were not found to be significant, notably, age, race, smoking status, and chemotherapy within 90 days. Our predictive model (boosted CHAID model) based on these risk factors of unplanned conversion was able to create a risk score for each patient. This could guide decision making in the future. This model could be retrained using each hospital's specific data to represent a hospital's population.

COMPARISON OF LONG-TERM ONCOLOGICAL OUTCOMES AFTER CURATIVE SURGERY BETWEEN RIGHT-SIDED AND LEFT-SIDED STAGE I-III COLON CANCER PATIENTS.

P391

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Purpose/Background: Colorectal cancer is one of the most common cancer. Some studies reported the difference in gross macroscopic finding and molecular biology pattern between right sided and left sided colon cancers. There has been debatable that whether the right sided and left sided colon cancers are two separate disease entities. This study aims to compare long term oncological outcomes between right sided and left sided locations after curative surgery in stage I-III colon cancer patients.

Methods/Interventions: We performed a retrospective cohort study comparing between right sided and left sided stage I-III colonic adenocarcinoma patients who underwent curative surgery at Siriraj hospital between January 2007 and December 2011. Right sided location was defined as the tumor located proximal to the splenic flexure whereas left sided tumor located from splenic flexure to rectosigmoid colon. Demographic data, perioperative data, pathological staging, postoperative short-term outcomes as well as long-term oncological outcomes were reviewed and analyzed.

Results/Outcome(s): 325 patients were diagnosed of colon cancer and underwent curative surgery; 99 right sided and 226 left sided. There was no difference in gender. Right sided colon cancer patients were older and had more hypertension and diabetes comorbidities. Left sided tumors needed more en-bloc other organs resection; therefore, more operative time, intraoperative and postoperative overall complications as well as longer postoperative hospital stay were noted. There was no difference in stage distribution and pathological results between two groups, except right sided tumors were more poorly differentiated and had more numbers of harvested lymph nodes. The Kaplan-Meier estimated for 5-year local recurrence, 5-year distant recurrence, 5-year overall and 5-year disease free survivals were not difference between two groups. When performing sub-stage analysis, only 5-year overall survival in stage I disease of right sided cancer was worse than left sided cancer [Table]. However, age-adjusted with multivariate Cox regression analysis showed no significant difference in 5-year overall survival in stage I disease between two groups [HR=1.05; 95% CI = 0.96 – 1.14; p= 0.316].

Conclusions/Discussion: Although right sided colon cancer patients have more advanced age and more aggressive cancer biology, the curative treatment strategy should be applied same as left sided colon cancer patients because of similar long-term oncological results.

P390 Case-matched Outcomes

Outcomes	Robotic w/ Unplanned	Laparoscopic w/ Unplanned	Planned Open (N=204)	P-value
	Conversion (N = 204)	Conversion (N = 204)		
Operation Time (min)	284.193 ± 132	222.03 ± 121	176.569 ± 107	
Operation to Discharge (days)	6.527 ± 7.7	6.715 ± 6.9	5.54 ± 7.2	0.005
Sepsis	6	4	3	0.578
Bleeding Transfusions	19	21	14	0.454
Return to OR	26	25	7	0.004
Unplanned Readmissions	40	35	18	0.007
Ileus	56	52	34	0.022
Deep Vein Thrombosis	6	4	3	0.782
On Ventilator	5	5	4	>0.99
Superficial SSI	29	31	14	0.019

COLORECTAL CANCER-RELATED BRAIN METASTASIS: A CASE SERIES.

P392

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Purpose/Background: Brain metastases (BM) from colorectal cancer (CRC) are rare. This series aims to review the characteristics and outcomes associated with CRC related BM.

Methods/Interventions: We reviewed the medical records of patients with BM from CRC between 2013 & 2018. Data collected include patients demographics, tumor clinicopathologic characteristics and molecular profile, time to brain metastasis (TTBM), treatment modalities for metastasis and survival with BM (SBM). Primary tumors involving and distal to the splenic flexure were considered left- sided (LS) tumors. TTBM and SBM were assessed using the Kaplan Meier method.

Results/Outcome(s): We identified 16 patients with BM from CRC. 11 patients were males. Mean age was 59 years (range: 42 – 75 years). 12 (75%) patient had LS primaries. 2 (12.5) patients have no other sites of metastasis. Mutant K-RAS was present in 7 (43.8%) patients. Median TTBM was 19.5 months. Median SBM was 5 months (range 3 Mo – 35 months). We observed substantially better survival

(17.4 months, $P < 0.002$) in patients treated with surgery followed by whole brain radiotherapy (WBRT) than those patients treated with radiotherapy or gamma knife alone. Sex, age, molecular profile and the number of brain metastasis did not affect survival.

Conclusions/Discussion: CRC related BM is rare and carries a poor prognosis. Although it develops late in the context of systemic metastasis, it can be the only site of metastasis in few patients. Majority of patients have LS primaries. Those receiving treatments with surgery and WBRT have better outcomes.

PRACTICE PATTERNS OF ADJUVANT CHEMOTHERAPY ADMINISTRATION FOR STAGE II COLON CANCER IN THE UNITED STATES.

P393

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Purpose/Background: Colorectal cancer is the third most common cause of cancer-related deaths. Early stage colon cancer is highly curable with surgical treatment. The role of adjuvant chemotherapy in stage II colon cancer is controversial but recommended to patients having high risk features. This study was conducted to define practice patterns of

P391 Right sided and left sided colon cancer patients' perioperative data and outcomes

	All (n = 325)	Right side (n = 99)	Left side (n = 226)	P-value
Mean age (years)	64.74 ± 12.08	67.62 ± 12.49	63.48 ± 11.71	0.004*
Male gender	177 (54.5%)	53 (53.5%)	124 (54.9%)	0.824
Diabetes	61 (18.8%)	26 (26.3%)	35 (15.5%)	0.022*
Hypertension	120 (36.9%)	46 (46.5%)	74 (32.7%)	0.018*
Mean operative time (min.)	199.8 ± 87.3	161.9 ± 58.3	216.4 ± 92.7	<0.001*
En-bloc other organs resection	36 (11.1%)	1 (1.0%)	35 (15.5%)	<0.001*
Intraoperative complications	18 (5.5%)	3 (3%)	15 (6.6%)	0.025*
Postop. overall complications	59 (18.2%)	11 (11.1%)	48 (21.2%)	0.029*
Postop. surgical complications	44 (13.5%)	8 (8.1%)	36 (15.9%)	0.057
Postop. medical complications	22 (6.8%)	4 (4.0%)	18 (8.0%)	0.195
Postop. ICU stay	50 (15.4%)	10 (10.1%)	40 (17.7%)	0.081
Median postop. hospital stay (days)	10 [IQR: 8,12]	8.5 [IQR: 7,10]	10 [IQR: 8,14]	<0.001*
Postop. 30-day readmission	3 (0.9%)	1 (1.0%)	2 (0.9%)	1.000
Postop. 30-day mortality	6 (1.8%)	2 (2.0%)	4 (1.8%)	1.000
Poorly differentiated tumor	14 (4.3%)	9 (9.1%)	5 (2.2%)	0.017*
Lymphovascular invasion	81 (24.9%)	25 (25.3%)	56 (24.8%)	0.928
Median no. of harvested lymph node	20 [IQR: 15,28]	22 [IQR: 17,30]	19 [IQR: 14,28]	0.011*
Positive margin	20 (6.2%)	7 (7.1%)	13 (5.8%)	0.720
5-year local recurrence (95% CI)	3.26% (1.71,6.18)	3.62% (1.18,10.8)	3.09% (1.4,6.7)	0.955
5-year distant recurrence (95% CI)	22.46% (17.94,27.90)	19.89% (12.61,30.59)	23.42% (18.07,30.03)	0.446
5-year overall survival (95% CI)	76.3% (71.3,80.6)	70.7% (60.7,78.6)	78.8% (72.8,83.5)	0.370
Stage I		85% (60.4,94.9)	100%	0.018*
Stage II		72.2% (54.5,84.0)	84.3% (74.9,90.4)	0.190
Stage III		62.8% (46.6,75.3)	66.3%(56.2,74.6)	0.560
5-year disease free survival (95% CI)	76.5% (71.1,81.1)	80.1% (69.4,87.4)	75.2% (68.5,80.6)	0.316
Stage I		87.1% (57.3,96.6)	93.6% (76.6,98.4)	0.452
Stage II		86.5% (68.0,94.7)	79.9% (69.2,87.2)	0.520
Stage III		72.5% (54.6,84.3)	63.7% (52.5,73.0)	0.281

adjuvant chemotherapy administration for stage II colon cancer in the United States. Our secondary aim was to find single versus multi agents chemotherapy administration.

Methods/Interventions: The National Cancer Database (NCDB) provided by the Commission on Cancer (CoC) was utilized to study patients with stage II colon cancer diagnosed between 2004 and 2015. The administration of chemotherapy was studied in relationship with demographic, clinical and pathologic characteristics of patients.

Results/Outcome(s): Among 236984 patients diagnosed with colon cancer between 2004 and 2015, 3049 had stage II disease and were included in analysis. Mean age at diagnosis was 67 years, and 51.2% of patients were male. Eighty-three percent of patients were Caucasians and 9.5% were African-Americans. Of 3,049 patients, 184 (6%) had age 45 years or less, 167 (5.5%) had pathologic T4 cancer, 438 (14.4%) had high grade histology and 170 (5.6%) had lymphovascular invasion. Six hundred and seventy (21.9%) patients with stage II colon cancer received adjuvant chemotherapy. Eighty (47.9%) patients with pathologic T4 cancer, 120 (27.4%) with high grade histology, and 55 (32.3%) patients with lymphovascular invasion received adjuvant chemotherapy. Younger patients (< 45 years) were significantly more likely to receive adjuvant chemotherapy than older patients [47.3% vs. 20.3, respectively ($p < 0.0001$)]. Adjuvant chemotherapy was multiagent in 58.9% of patients and single agent in 41.1%.

Conclusions/Discussion: In this population with stage II colon cancer patents based on NCDB, adjuvant chemotherapy was most common among patients with pathologic T4 disease and younger age (45 years or less). When adjuvant chemotherapy was administered, it was more likely to be multiagent. More studies are needed to determine the role of adjuvant chemotherapy in stage II colon cancer.

COMPARISON OF CHARACTERISTICS AND OUTCOMES IN PATIENTS PRESENTING WITH COLORECTAL CANCER AMONG YOUNG AND OLD PATIENTS IN A MIDDLE EASTER POPULATION.

P394

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Purpose/Background: The aim of the study is to compare the clinical patterns of presentation and outcomes of patients presenting with colorectal cancer ≤ 50 years old in comparison to colorectal cancer in those > 50 years old.

Methods/Interventions: A retrospective review of all patients over who were admitted to the surgical service with a diagnosis of colon and rectal cancer between January 2011 and October 2018 at a major university affiliated government hospital in the state of Kuwait. Data

collected included patients' demographics, clinical presentation, management and outcome.

Results/Outcome(s): Between January 2011 and October 2018 there were 241 patients admitted with a diagnosis of colon or rectal cancer. Patients diagnosed through the screening program comprised 35.5% of the cohort. Colorectal cancer in those ≤ 50 years of age represented 29%, with a mean age of 42.2 [± 6.9] years. The mean age of patients > 50 years was 64.9 [± 9.5]. In those ≤ 50 years the pattern of presentation included incidental finding in 21 (31.3%) patients, gastrointestinal bleeding in 19 (28.4%) patients, anemia in 7 (10.4%), abdominal pain in 7 (10.4%), bowel obstruction in 6 (9%) and altered bowel habit in 3 (4.5%). In those > 50 years the pattern of presentation included incidental finding in 64 (38.1%) patients, gastrointestinal bleeding in 30 (17.9%) patients, abdominal pain in 25 (14.9%), anemia in 21 (12.5%), bowel obstruction in 17 (10.1%) and altered bowel habit in 7 (4.2%). Table 1 summarizes the patient characteristics and outcomes.

Conclusions/Discussion: Our study reveals that the patterns of presentation and short-term outcomes of those presenting with colorectal cancer ≤ 50 years old are similar to those presenting with colorectal cancer > 50 years old. Furthermore, approximately one third of patients in the cohort were diagnosed through screening representing a need to increase utilization of the colon cancer screening program in Kuwait.

INDOCYANINE GREEN-ENHANCED FLUORESCENCE TO ASSESS BOWEL PERFUSION DURING ROBOTICS-ASSISTED RECTAL SURGERY.

P395

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Purpose/Background: Anastomotic leakage after rectal resection is a dreadful complication. One possible cause of anastomotic leakage is insufficient vascular supply, especially with usage of preoperative chemoradiotherapy for rectal cancer. The aim of this study was to evaluate the feasibility and the usefulness of intraoperative assessment of vascular anastomotic perfusion in robotics low anterior resection (LAR) using indocyanine green (ICG) fluorescence angiography (FA).

Methods/Interventions: We categorized the patient retrospectively in two group. Both groups were collected consecutively, 30 patient with ICG compared to non-ICG group diagnosis as rectal cancer underwent robotic surgery. From November 2017 to April 2018, 30 patients underwent Robotics LAR with TME without ICG and another group of patients was collected from April 2018 to November 2018, 30 patient underwent robotics rectal surgery with

ICG, We assess the bowel perfusion by using 10 mg of ICG which was injected intravenous in all patients within ICG group undergoing Robotics LAR with TME for rectal cancer followed by colorectal or coloanal anastomosis. All anastomosis and resection margins were investigated using FA intraoperatively 2-3 minutes after injection to assess vascular perfusion prior to and after completion of the anastomosis. All patients underwent Intraoperative colonoscopy examination to check bowel perfusion and air leakage test and there was no positive air leakage and both proximal and distal donut was checked and it was complete. All calculation was performed by using SPSS software version 23 and we used chi-square test, T-test for statistic analysis.

Results/Outcome(s): The mean age in the ICG group is 55.2 while the mean age in non ICG is 53.2 with P value is 0.50, While the mean BMI in ICG group 23 on other hands the mean of BMI in was-ICG group is 22.8 with P value is 0.75, The mean level of tumor location from AV was 6.9 cm in ICG group and 6.9 cm in non ICG group with P value is 0.95. Among 30 patients, 60% of patients received preoperative chemoradiotherapy in both groups. In ICG group underwent robotic LAR, 25 patients

underwent TME with circular stapled anastomosis and patients underwent hand-sewn coloanal anastomosis in ICG group while in the non-ICG group, 16 patients underwent TME with circular stapled anastomosis and 14 patients underwent hand-sewn coloanal anastomosis. In 73.3% of ICG group compared to 66.7% non ICG group, low ligation of IMA was performed with P value 0.572. The surgeon subjectively decided to change the planned anastomotic of the descending colon due to the hypoperfused in a distal segment in one patient out of 30 patients in the ICG group. Postoperative anastomotic leakage was confirmed clinically and radiological in one patient in both groups 3.3% respectively. Both patients analysis by diversion ileostomy and conservative treatment. No adverse events related to FA were recorded.

Conclusions/Discussion: Based on our preliminary results, one case was diagnosed as a leak in both groups. ICG considers as a useful intraoperative tool about the vascular perfusion during LAR and may lead to change the site of resection and/or anastomosis, possibly affecting the anastomotic leak. Larger further randomized prospective trials are needed to validate this new technique.

P394 Table 1 - Summary of patient characteristics and outcomes

	50 years or less N=70	51 years and more N=171	p-value
Sex			0.258
Male	34 (48.6%)	97 (56.7%)	
Female	36 (51.4%)	74 (43.3%)	
Arabs	48 (69.6%)	150 (87.7%)	0.001
Tumor location			0.629
Right	22 (31.4%)	43 (25.1%)	
Left	44 (62.9%)	118 (69.0%)	
Rectum	4 (5.7%)	10 (5.8%)	
Stage			0.505
1	10 (18.2%)	35 (26.9%)	
2	12 (21.8%)	31 (23.8%)	
3	29 (52.7%)	54 (41.5%)	
4	4 (7.3%)	10 (7.7%)	
Emergency surgery	9 (12.9%)	23 (13.5%)	0.550
Median LOS (IQR)	12.0 (8.0, 19.0)	11.3 (9.0, 24.0)	0.025
Median follow-up in weeks (IQR)	74.2 (8.9, 116.5)	92.1 (12.1, 158.7)	0.112
Readmission within 30-days	2 (2.9%)	16 (9.4%)	0.106
30-day complications	14 (20.0%)	38 (22.2%)	0.863
Overall mortality	1 (1.4%)	6 (3.5%)	0.677

P395 Patient Characteristic

Patient Characteristic	ICG	Non ICG	P value
Total Patients	30	30	
Age	55.2 ± 2.4	53.2 ± 2.4	0.509
Sex			0.432
Male	19 (63.3%)	14 (47.7%)	
Female	11 (37.7%)		
ASA			0.107
1	11 (36.6%)	8 (26.6%)	
2	17 (56.6%)	14 (46.6%)	
3	2 (6.8%)	8 (26.8%)	
4	0	0	
Distance from Anal Verge	6.9 ± 0.5	6.9 ± 3.4	0.958
Clinical Stage			0.730
I	9	9	
IIA	3	3	
IIB	3	1	
IIIA	3	8	
IIIB	11	9	
IIIC	1	0	
IVA	0	0	
IVB			
T			0.856
1	5	4	
2	6	4	
3	16	18	
4	3	4	
N			1
0	13	13	
1	8	8	
2	9	9	
3	0	0	
M			0.317
0	29	30	
1	1	0	
IMA Ligation			0.573
Low	22 (73.3%)	20 (66.7%)	
High	8 (26.7%)	10 (33.3%)	
Anastomosis			0.012
Stapled	25	16	
Hand	5	14	
BMI	23 ± 0.7	22.8 ± 0.4	0.754
Preop Chemoradiation	60%	60%	1
mrTRG			0.73
1	1	12	
2	11	1	
3	2	12	
4	13	4	
5	3	1	
Simultaneous Surgery			0.237
0	27	30	
1(Hepatobiliary)	1	0	
2(Gastric)	1	0	
3(Urology)			
Diversion	56.6%	63.3%	0.598
Ileostomy			
Types Of surgery			0.075
LAR	20 (54.1%)	20 (54.1%)	
Ultra LAR WITH CAA	6 (16.2 %)	6 (16.2 %)	
Ultra LAR WITH CAA,ISR	4 (10.8%)	4 (10.8%)	
Leakge	1 (3.3 %)	1 (3.3 %)	1

ONCOTYPE DX® TESTING DOES NOT AFFECT CLINICAL PRACTICE IN STAGE IIA COLON CANCER.

P396

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Purpose/Background: Patients with stage II colon cancer are a diverse group of patients with overall recurrence between 10-28% at 5 years based on tumor size and poor prognostic factors. The 12 gene Oncotype Dx® colon recurrence score is used to guide treatment decisions in patients with pathologic stage II colon cancers to determine who would benefit from adjuvant chemotherapy. While some studies have demonstrated that the Oncotype Dx has influenced treatment decisions, the test is expensive (list cost of \$3,640 in 2014) and score itself is prognostic rather than predictive. The purpose of this study was to evaluate the influence of the Oncotype Dx® in the decision to offer adjuvant chemotherapy or surveillance after resection of Stage IIA colon cancer at a large tertiary referral center.

Methods/Interventions: After IRB approval, a retrospective review was performed of all consecutive patients with stage IIA (T3, N0) colon cancer who underwent Oncotype Dx® testing between January 2011 and September 2018 at an academic tertiary referral center. Demographics, test scores, decision for surveillance or undergo chemotherapy, complications, recurrence, and follow up data were collected. Pathological risk factors such as poor differentiation, high grade, perineural invasion (PNI), lymphovascular invasion (LVI), large vessel involvement, KRAS, and microsatellite instability (MSI) were collected. Patients who were found to have metastasis during their post-operative work up as cases where clinical outcomes have not been determined (lost to follow up before decision or had not yet met with oncologist) were excluded.

Results/Outcome(s): 56 consecutive patients underwent Oncotype Dx® testing. 5 patients were excluded because of short follow up (n=2) or developed metastasis (n=3). Of the 51 patients included, 35 (69%) were male with an average age of 67 years (range 30-89). 14 patients (27%) had high risk pathological features including PNI (n=3), LVI (n=12), MSI (n=1), and large vessel involvement (n=1). There was no significant difference in Oncotype Dx® score between the normal risk group (average 18, range 3-43) and in the high risk group (average 24, range 9-46) (p>0.05). There were no recurrences in our cohort, with 48 patients having at least 6 months of follow up (average 25, range 1-60 months). One patient was found to have lung metastasis one year post-operatively. 5 patients (10%) underwent chemotherapy after Oncotype Dx® testing (average score 29, range 9-43). Of these 5 patients, 1 had PNI and a score of 9, 2 had post-operative anxiety had requested chemotherapy (scores of 21

and 21), 1 patient had extramural large vessel involvement with score of 40, and 1 patient was KRAS positive with a score of 43. In the 21 patients with scores above 20, 4 (19%) underwent chemotherapy. There was no association between score and treatment choice, as many patients with elevated scores also chose to undergo surveillance only (R²=0.028).

Conclusions/Discussion: Decision to undergo adjuvant chemotherapy in stage IIA colon cancer to help reduce recurrence can be difficult and is influenced not only by pathological risk factors but also individual patient preferences after a discussion about its risks and benefits. While Oncotype Dx® has been validated to determine the risk of recurrence, our study suggests that obtaining this assay in T3, N0 disease is not correlated with clinical decision making and that high risk features may play a more important role. There is one patient in our cohort where the Oncotype Dx® score may have influenced the clinical decision for chemotherapy. In the other 4 who underwent chemotherapy, the assay result was either not the reason for adjuvant therapy or anxiety regarding the scores and potential benefit (although small) may have led to treatment. Given that the list cost for the Oncotype Dx® was \$3,640 in 2014, the lack of recurrence in either group (surveillance vs chemotherapy) may suggest that this test could even lead to overtreatment in some cases, further leading to extra time, stress, and cost not only for the patient but also for the medical system.

RISK SCORE TO PREDICT POSITIVE MARGIN AFTER RECTAL CANCER RESECTION: AN ACS NSQIP TARGETED PROCTECTOMY DATABASE ANALYSIS.

P397

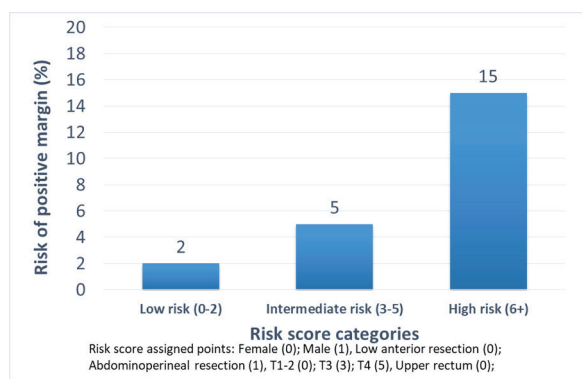
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Purpose/Background: Patient, surgeon and tumor characteristics affect margin positivity after rectal cancer resection. Our aim is to create a risk score to predict positive margin after rectal cancer resection. We hypothesize that open resection is associated with lower risk of positive margin in the highest risk group.

Methods/Interventions: The 2016 ACS NSQIP targeted proctectomy database was used for analysis. Patients with missing oncologic data, emergency resection, and disseminated cancer were excluded. Multivariate logistic regression analysis was used to create a model for prediction of positive composite (radial and distal) resection margin. The beta coefficients from the final model were converted into points and the sum of the points represented an overall score that was categorized into low-, intermediate-, and high-risk groups. The association of surgical approach (robotic vs. laparoscopic vs. open) with margin positivity was tested within each of the risk-score categories.

Results/Outcome(s): Out of 4,217 patients in the database, 1,161 met inclusion criteria. The mean age was 62 and mean BMI was 28. About 50% of patients had T3/4 tumors and 56% received neoadjuvant chemoradiation. T stage (T3 vs. Tis-T2; OR 3.97; 95% CI 2.22-7.09, T4 vs. Tis-T2; OR 9.56; 95% CI 4.71-19.38), abdominoperineal resection vs. low anterior resection (OR 1.69; 95% CI 1.01-2.84), male vs. female (OR 1.59; 95% CI 0.96-2.62) and tumor location (middle rectum vs. upper rectum; OR 2.26; 95% CI 0.95-5.36, lower rectum vs. upper rectum; OR 1.73; 95% CI 0.72-4.15) were the model variables. The model AUC was 0.72. Patients with total score of 0-2 (low-risk), 3-5 (intermediate-risk) or ≥ 6 (high-risk) had a corresponding positive margin risk of 2%, 5% and 15% respectively. There was no difference in margin status by surgical approach within each of the three risk-score categories.

Conclusions/Discussion: Male gender, abdominoperineal resection, advanced T stage and low tumor location are associated with increased risk for positive margin. The risk of positive margin increases incrementally by increasing composite risk score such that male patients undergoing abdominoperineal resection for T3/4 mid- or low rectal cancer are at the highest risk of positive margin. However, surgical approach does not mitigate the risk of positive oncologic margin after rectal cancer resection.



FUNCTIONAL OUTCOMES AFTER RIGHT-SIDED COLECTOMY FOR COLON CANCER.

P398

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Purpose/Background: There have been many studies on low anterior resection syndrome (LARS), which is a bowel function problem after left-sided colectomy or proctectomy for colorectal cancer. However, changes in the bowel function after right-sided colectomy are not well known. We planned a study to evaluate the functional outcomes of patients who underwent right-sided colectomy for colon cancer.

Methods/Interventions: Functional data of patients who underwent right-sided colon cancer colectomy from October 2017 to September 2018 were prospectively collected. Functional outcomes were evaluated preoperatively and at 3 months, 6 months, and 12 months postoperatively. Quality of life (QoL) was assessed using EORTC QLQ-C30 while defecational function was analyzed using LARS score.

Results/Outcome(s): Prior to surgery, 59 patients answered the questionnaire, with 32 responders at 3 months, 24 at 6 months, and 2 at 12 months postoperatively. Global health status and emotional functioning were significantly improved over time ($p < 0.001$; $p = 0.001$). Pain scale also improved ($p = 0.011$). The QoL associated with symptoms such as constipation or diarrhea did not show any significant change during the period. Approximately half of the patients were receiving chemotherapy at 3 and 6 months after surgery, but the global health status was better in patients receiving chemotherapy ($p = 0.020$), while the cognitive function was significantly worse ($p = 0.047$). The defecational function did not change statistically over time, and there was almost no leakage in the whole period. The ratio of major LARS group decreased after surgery. Antidiarrheal or laxative medications had to be taken by 25% of the patients at 3 months and 15.6% at 6 months postoperatively. Drug intake and fecal fragmentation have a significant correlation ($p = 0.016$), suggesting that patients with fecal fragmentation take many medications.

Conclusions/Discussion: The bowel functional outcomes after right-sided colectomy did not significantly affect the quality of life of the patients and no significant change was observed during the postoperative period. Bowel medication was needed in about 20% of the patients, with fragmentation as the main reason for medication.

DOES TUMOR SIDEDNESS AFFECT SURVIVAL AFTER CME WITH D3 LYMPHADENECTOMY FOLLOWED BY ADJUVANT CHEMOTHERAPY IN PATIENTS WITH STAGE II AND III COLON CANCER?

P399

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Purpose/Background: Recent studies demonstrate that right-sided stage IV colon cancer has an inferiority in survival compared to left-sided stage IV colon cancer due to distressing biologic features. However, it is debatable whether primary tumor location also has an effect on oncologic outcomes in the adjuvant setting. We aimed to investigate whether tumor sidedness affects survival after complete mesocolic excision (CME) with D3 lymphadenectomy in patients with stage II and III colon cancer who received adjuvant chemotherapy.

Methods/Interventions: A total of 584 colon cancer patients who received adjuvant chemotherapy for stage III and stage II with risk factors were collected from our database between 2006 and 2015. All patients underwent

CME with D3 lymphadenectomy. For this analysis, the right colon included the cecum, the ascending colon, the hepatic flexure and the transverse colon, whereas the left colon included the splenic flexure, the descending colon

P399

	Right (n=282)	Left (n=302)	P
Age	61±11	61±11	0.544
Sex (M:F)	155(55.0%): 127(45.0%)	187(61.9%): 115(38.1%)	0.088
ASA (1:2:3:4:unknown)	87(30.9%): 177(62.8%): 14(4.9%): 0: 4(1.4%)	114(37.7%): 173(57.3%): 15(5.0%): 0: 0	0.257
Lesion			
Cecum:A-colon:HF-colon:T-colon	65(23.1%): 109(38.7%): 54(19.1%): 54(19.1%)		
SF-colon:D-colon:S-colon		10(3.3%): 38(12.6%): 254(84.1%)	
Pre CEA (ng/mL)	5.45±11.45	6.28±14.88	0.477
Preoperative complication			0.186
Obstruction	48(17.0%)	42(13.9%)	
Perforation	5(1.8%)	15(5.0%)	
Bleeding	2(0.7%)	1(0.3%)	
Obstruction & Perforation	2(0.7%)	3(1.0%)	
Op type			0.045
Laparoscopy	244(86.5%)	282(93.4%)	
Robot	8(2.8%)	3(1.0%)	
Open	25(8.9%)	14(4.6%)	
Conversion	5(1.8%)	3(1.0%)	
Op time (min)	190±66	190±76	0.997
Estimated blood loss (ml)	107±243	97±298	0.664
Pathologic findings			
Tumor size (cm)	5.42±2.36	2.98±2.84	0.048
pT (1:2:3:4)	1(0.4%):8(2.8%):245(86.9%):28(9.9%)	12(4.0%):18(6.0%):241(79.8%):8(2.6%)	0.005
pN (0:1a:1b:1c:2a:2b)	118(41.8%):59(20.9%):61(21.6%):3(1.1%):21(7.4%):20(7.1%)	31(10.3%):69(22.8%):67(22.2%):8(2.6%):33(10.9%):18(6.0%)	0.309
Retrieved LNs	2±4		<0.001
Lymphatic invasion	33±16	2±5	0.045
Venous invasion	69	26±16	0.493
Perineural invasion	17	52	0.111
	13	14	
		23	
Postop hospital stay (d)	10±5	10±6	0.614
Complication in 30days	58(20.6%)	32(10.6%)	0.005
Leakage	10(3.5%)	4(1.3%)	0.079
Ileus	21(7.4%)	9(3.0%)	0.015
Adjuvant chemotherapy			0.725
FOLFOX	187(66.3%)	209(69.2%)	
FOLFIRI	0	1(0.3%)	
IV 5-FU	20(7.1%)	18(6.0%)	
Oral 5-FU	75(26.6%)	74(24.5%)	
Mean f/u period (m)	65±32	63±30	0.515
Recur (total)	41(14.5%)	41(13.6%)	0.738
Local	6(2.1%)	4(1.3%)	0.534
Systemic	34(12.1%)	35(11.6%)	0.861
Death	38(13.5%)	34(11.3%)	0.415

and the sigmoid colon. The 5-year overall survival (OS), the systemic and local disease free survival (DFS) were compared between the two locations

Results/Outcome(s): Two hundred eighty-two patients of right-sided colon cancer and 302 patients of left-sided colon cancer were reviewed. Median follow-up was 60 months. Right colon cancer showed larger tumor size (mean 5.42 cm versus 2.98 cm, $P=0.048$), more advanced pT stage (pT3 and T4; 96.8% versus 90.1%, $P=0.005$), more retrieved lymph nodes (33 versus 26, $P<0.001$), and more complications in postoperative 30 days especially ileus (7.4% versus 3.0%, $P=0.015$). There was no difference in 5-year OS (85.8% versus 88.6%, $P=0.466$), 5-year systemic DFS (83.4% versus 85.0%, $P=0.831$) and 5-year local DFS (97.5% versus 98.5%, $P=0.477$) between two groups.

Conclusions/Discussion: Tumor sidedness does not seem to affect on long-term survival in the adjuvant setting when CME with D3 lymphadenectomy is performed in patients with stage II and III colon cancer.

GASTROINTESTINAL MALIGNANCIES IN PATIENTS WITH COWDEN SYNDROME.

P400

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Purpose/Background: Cowden syndrome is an inherited PTEN mutation, which predisposes patients to a number of malignancies as well as gastrointestinal polyposis. Due to the rare nature of this syndrome, there are limited studies of polyposis and the risk of malignant degeneration in this population. We aim to describe the frequency and progression of gastrointestinal malignancies in patients with Cowden syndrome.

Methods/Interventions: We reviewed all patients with clinically or genetically confirmed Cowden syndrome who

presented to our institution. Data on clinical presentation, endoscopy, operative, pathology reports and ultimate treatment was analyzed.

Results/Outcome(s): Forty-seven patients treated at our institution with a diagnosis of Cowden's syndrome between 1979 and 2018. Thirty five patients received a diagnosis based on clinical features and family history, while 12 had genetic testing indicating a mutation of the PTEN gene. In total five (10.7%) patients were diagnosed with gastrointestinal malignancies, of which two (4.3%) were diagnosed with adenocarcinoma of the colon, one (2.1%) was diagnosed with a small bowel carcinoid tumor, one (2.1%) patient was diagnosed with esophageal adenocarcinoma, and one (2.1%) was diagnosed with squamous cell carcinoma of the anal margin. Among these five patients none died from their disease and none were found to have recurrence during their follow-up at our institution. In total four (8.5%) patients underwent subtotal or total colectomy, three for treatment of colon cancer and one due to a previous misdiagnosis of familial adenomatous polyposis (FAP). Two additional patients underwent small bowel resection, one for treatment of a small bowel carcinoid tumor, and one for partial small bowel obstruction secondary to severe polyposis. Colonoscopy reports were available for 19 patients. Of these patients, 14 (74%) had colon polyps. Six (31.6%) were found to have adenomatous polyps. Hamartomas were present in five (26.3%), ganglioneuromas were present in four (21.1%), and inflammatory polyps were present in four (21.1%). The most common non-gastrointestinal malignancies included breast (21.1%), thyroid (19.1%) and endometrial (8.8% of female patients).

Conclusions/Discussion: Gastrointestinal polyposis is common to Cowden syndrome, however GI malignancy is poorly understood. Approximately 10% of patients were diagnosed with gastrointestinal cancer, although mortality was nil. Currently NCCN screening guidelines followed at our institution appear appropriate to avoid cancer related mortality.

P400 Patient Characteristics and Outcomes

Gender (F/M)	34/13	72.3/27.7%
Method of diagnosis		
Clinical	35	74.5%
Genetic Testing	12	25.5%
Gastrointestinal Malignancy	5	10.6%
Adenocarcinoma, colon	2	4.3%
Adenocarcinoma, esophagus	1	2.1%
Carcinoid, small bowel	1	2.1%
Squamous cell carcinoma, anal verge	1	2.1%
Colonoscopy	19	40.4%
Polyposis on Colonoscopy	14	73.7%
Adenomatous	6	31.6%
Hamartoma	5	26.3%
Ganglioneuroma	4	21.1%
Inflammatory	4	21.1%

LARGE-SCALE STUDY OF INTRATUMOR HETEROGENEITY AND CLONAL EVOLUTION OF COLORECTAL CANCER.

P401

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Purpose/Background: Intra-tumor heterogeneity reflects the clonal evolution of the primary tumor and it is an important driving force for tumor progression, metastases and drug resistance, which becomes the biggest challenge for the effectiveness of personalized cancer therapy. Recent studies highlighted that multiregional sequencing approach, which sequences DNA samples from geographically separated regions of tumors from a single patient, for exploring the nature of intratumor heterogeneity (ITH) and cancer evolution. Large-scale sequencing studies have systematically revealed ITH as well as cancer evolution of non-small-cell lung cancer and renal cancer. However, large-scale sequencing studies of ITH and cancer evolution of Colorectal Cancer (CRC) was not explored well. In addition, most of the studies of ITH for CRC were performed by whole exome sequencing or targeted-gene panel based next generation sequencing with relatively low depths, which was not let us allow to assess the ITH due to the inability to identify the somatic mutations with low frequencies.

Methods/Interventions: In this prospective study, we performed multi-region whole-exome sequencing with 500X depth on early-stage colorectal tumors from 90 CRC patients (30 descending colon cancers, 30 ascending colon cancers and 30 rectal cancers patients). These early-stage colorectal tumors had been surgically resected before the start of any systemic therapy. We sequenced and analyzed 400 tumor regions including multi-regions of primary tumors together with lymph node metastasis and extranodal tumor deposits (ENTDs).

Results/Outcome(s): Our data shows that a clear evidence of ITH among primary colorectal tumors, both in terms of single nucleotide polymorphisms (SNPs) and copy number alterations (CNA). Universal alterations are enriched in several known cancer genes with different mutations and copy number changes in different tumor regions from the same patients. Multiregional sequencing identifies the ordering of driver events and sub-clonal mutational signatures, leading to infer the temporal and spatial evolution of CRC. Furthermore, genomic analysis of lymph node metastasis and ENTDs supports polyclonal origin of metastases from more than one region of the primary tumor. Our present data also proves that both ITH and clonal evolution are extremely varying with different locations (ascending colon, descending colon and rectum) of colorectal tumors.

Conclusions/Discussion: In conclusion, our present study is first time reporting the large-scale sequencing for understanding the ITH as well as cancer evolution of colorectal cancer and also suggests the significance of ITH as a potential biomarker for both surveillance and intervention for the patients with CRC.

DOES SURGICAL SITE INFECTION AFFECT DELIVERY OF ADJUVANT CHEMOTHERAPY FOR COLON AND RECTAL CANCER?

P402

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Purpose/Background: Timely initiation of systemic therapy after colorectal surgery for locally advanced and advanced stage colon and rectal cancer has been shown to decrease locoregional recurrence and improve overall survival. It is well known that post-operative complications delay or prevent adjuvant chemotherapy (AC), however the impact of surgical site infection (SSI) specifically has not been fully investigated. We hypothesized that development of an SSI is associated not only with delay but with omission in AC following elective colorectal resection for curative intent.

Methods/Interventions: This is a single institution, retrospective analysis of a prospectively maintained database of all patients undergoing colorectal surgery with curative intent between January 2010-June 2017. Patients were stratified by development of SSI and receipt of adjuvant chemotherapy, demographic and outcome variables were analyzed. AC was considered on-time if initiated ≤ 8 weeks postoperatively. Categorical variables were analyzed using standard Chi-square analysis and continuous variables were analyzed with Wilcoxon's Rank Sum. Multivariable logistic regression identified variables predictive of adjuvant chemotherapy treatment.

Results/Outcome(s): A total of 363 patients underwent resection for Stage II, III, or IV colon or rectal cancer with intent to cure. Of these, 53 patients (14.6%) developed an SSI: 32 superficial/deep SSI (8.8%) and 24 organ space SSI (6.6%). The development of an SSI was associated with a longer time to initiation of AC (59.1 ± 2.1 vs. 88.24 ± 6.7 days, $p < 0.0001$). Organ space SSI was associated with the longest delay in AC at 103.00 ± 12.66 days compared to 83.77 ± 7.55 days for a superficial SSI ($p < 0.001$). Significantly fewer patients received on-time AC following the development of an SSI compared to patients that did not develop an SSI (13.2% vs. 43.2%, $p < 0.0001$). AC was omitted altogether in 37.7% of patients that developed an SSI compared to 28.4% of patients that did not develop an SSI ($p < 0.001$). In a multivariable logistic regression model, the development of an SSI ($p=0.002$) in addition to prolonged length of stay ($p=0.008$), increasing age ($p<0.0001$), and black race ($p=0.025$) were independent predictors of delayed/omitted AC therapy.

Conclusions/Discussion: To the best of our knowledge, this is the only study looking specifically at development of SSI and time to chemotherapy in a colorectal cancer population. Other studies have shown that overall complications in the perioperative period negatively impact receipt of adjuvant chemotherapy. These data demonstrate the individual deleterious impact of development of an SSI on delivery of AC following elective colorectal resection. While organ space SSI had the greatest impact, a "simple" superficial

SSI delayed initiation of AC by more than 20 days. Timely AC has been shown to improve overall survival whereas AC regardless of timing to initiation is thought to increase recurrence free survival. SSI remains a thorn in surgeons' side and continued vigilance to minimizing SSI in colorectal cancer patients may positively influence survival.

REGIONAL VARIATION IN THE ADMINISTRATION OF ADJUVANT CHEMOTHERAPY: THE ASSOCIATION OF COLON AND RECTAL SURGERY FELLOWSHIP PROGRAM DENSITY.

P403

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Purpose/Background: Colorectal cancer is third most common cancer and cancer-related deaths in the USA. Previous studies have documented geographic disparities in use of chemotherapy to treat colorectal cancer. Our research objective was to explore disparities in the administration of chemotherapy for colorectal cancer with respect to geographic density of colon and rectal surgery fellowship programs. The study is restricted to patients with lymph node positive colon cancer and Stage 2 or greater rectal cancer. The secondary objective was to evaluate these disparities with respect to other demographic and socioeconomic factors. We hypothesized that patients from regions with high-densities of colon and rectal surgery fellowship programs had higher probability of receiving adjuvant chemotherapy.

Methods/Interventions: After approval of a formal analysis request, we utilized the National Cancer Database (NCDB) for patients diagnosed with colorectal cancer between 2004 and 2015. Only patients with lymph node positive colon cancer and stage II-III rectal cancer were included in analysis. The thirteen NCDB-defined regions of the US and its territories were classified as low-density (seven or less programs) or high-density (eight or more programs) for ACGME-accredited colon and rectal surgery fellowships. T-tests and chi-square analyses were used to explore differences in receipt of chemotherapy across regions with high versus low density of colon and rectal surgery fellowship programs.

Results/Outcome(s): Of the 1,185,763 patients diagnosed with colorectal cancer between 2004 and 2015, 726,872 (61.3 %) were diagnosed with colon cancer and 264,425 (22.3 %) with rectal cancer. Twenty-eight percent of patients had lymph node positive disease. Between 2004 and 2015, the percent of lymph node positive patients receiving chemotherapy trended upward. In high vs. low fellowship density areas, we found no significant differences in age, race, type of payer programs however, there were more Commission on Cancer (CoC) facilities in the high-density areas than the low density areas. Adjuvant chemotherapy is more often administered in academic and

integrated network cancer programs. We found significantly more comprehensive community cancer programs in less dense regions and more academic and integrated network cancer programs in higher density regions. Among colon cancers, 42.5% and 53.0 % received adjuvant chemotherapy in low and high fellowship dense areas, respectively, while for rectal cancer 46.2% and 53.8% received chemotherapy, respectively. Better access to adjuvant chemotherapy could likely be attributed to the availability of funding, resources and practices of recent, evidence-based medicine and guidelines. The administration of adjuvant chemotherapy was more common among higher income quartile patients in regions with higher density of colon and rectal surgery fellowship programs. However lower income quartile patients received more chemotherapy in regions with fewer fellowship programs (16.4%) than in regions with higher fellowship programs (11.9%).

Conclusions/Discussion: Overall, adjuvant chemotherapy for colorectal cancer was accessible and administered more frequently among patients in regions with a higher density of colon and rectal surgery fellowship programs. Higher income quartile patients received chemotherapy more frequently in regions of high density fellowships. Interestingly, patients belonging to lower income quartiles were more likely to receive chemotherapy in regions with fewer fellowship programs. Although ideally, availability of resources and funding in these areas of denser fellowship programs should facilitate increased administration of chemotherapy to lower income quartile patients, our results were contrary to it. This disparity of chemotherapy use in low income quartile compared to high income in higher density of fellowship areas needs attention. Further studies should identify the contributing factors as we aim to provide equity of healthcare services.

OUTCOMES ARE WORSE FOR IMMUNOSUPPRESSED ANAL CANCER PATIENTS.

P404

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Purpose/Background: Immunosuppressed patients, including those with solid organ/bone marrow transplant, and chronic steroid use, have an increased risk of developing anal squamous cell carcinoma (ASCC). Little data exists regarding overall outcomes of this population compared to non-immunosuppressed patients with ASCC.

Methods/Interventions: All patients diagnosed with ASCC at a single academic institution from years 2004-2017 were reviewed. Patients with history of organ transplant, bone marrow malignancy, and chronic steroid use were compared to non-immunosuppressed patients. HIV positive patients who did not meet AIDS criteria were

not classified as immunosuppressed. Overall survival was compared via cox regression using date of diagnosis.

Results/Outcome(s): A total of 136 patients with ASCC were identified; 15(11%) were immunosuppressed. The two groups were demographically similar; when comparing immunosuppressed and non-immunosuppressed there was no significant difference in mean age at diagnosis (57.8, SD 13.5 vs 59.3, SD 12.0), ethnicity (73% non-Hispanic white vs 76%), gender (53% male vs 31%), or insurance status (40% privately insured vs 50%), all $p>0.05$. There was no significant difference in presenting stage, with a majority of patients presenting with either Stage II or III disease (66% vs 76%). Immunosuppressed patients were significantly less likely to complete chemotherapy (47% vs 81%, $p<0.001$), and less likely to complete radiation therapy, although this was not significant (60% vs 85%, $p=0.096$). Of those patients who completed chemoradiation therapy, only 40% of immunosuppressed patients were identified as complete responders, compared to 79% of non-immunosuppressed patients ($p<0.01$). Immunosuppressed patients were more likely to experience recurrence (53% vs 26%, $p<0.05$) and to develop metastatic disease (27% vs 5%, $p<0.01$). On univariate analysis, immunosuppressed patients had worse overall survival compared to non-immunosuppressed patients (HR 3.0, CI 1.3-7.1, $p<0.05$). On multivariate analysis evaluating gender, age, race, and HIV status, immunosuppressed patients persistently demonstrated significantly worse overall survival (HR 2.8, CI 1.1-6.9, $p<0.05$). Figure 1 shows the Kaplan-Meier survival curve demonstrating increased mortality for immunosuppressed patients ($p<0.01$).

Conclusions/Discussion: Immunosuppressed patients not only have a higher risk of developing ASCC, they are also less likely to tolerate chemotherapy and less likely to achieve a complete response to chemoradiation. Immunosuppressed patients are more likely to develop metastatic disease, and have worse overall survival compared to non-immunosuppressed patients.

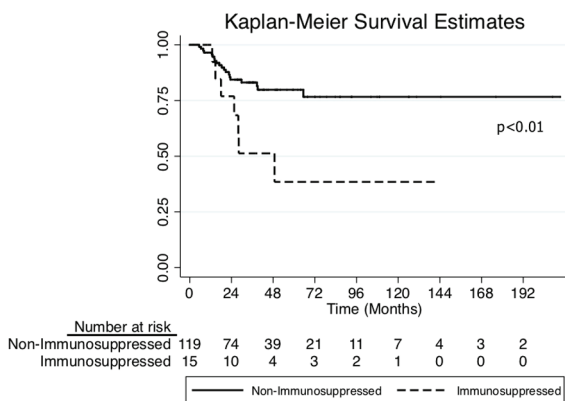


Figure 1: Kaplan-Meier overall survival curve comparing immunosuppressed vs non-immunosuppressed patients with anal cancer.

COLONIC ANGIOLIPOMA: AN ENIGMA TO SURGERY.

P405

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Purpose/Background: Angiolipomas are benign tumors composed of adipose tissue and proliferating blood vessels. They more commonly occur in the musculoskeletal system. However, fewer than ten cases of colorectal angiolipomas have been reported in the literature making this location an extremely rare finding. Here we review a case of a rectosigmoid junction angiolipoma and treatment options.

Methods/Interventions: A 65-year-old female presented with painless rectal bleeding to her primary care provider. She denied abdominal pain, weight loss, dizziness, lightheadness, fatigue, fever, or chills. Her past medical history is significant for diverticulosis and benign colonic polyps. Her history is also notable for coronary artery disease and myocardial infarction. Current medications are limited to aspirin and alprazolam. Prior abdominal surgery included a hysterectomy for fibroids 30 years prior. She has no personal or family history of cancer. Diagnostic work-up included complete blood count and basic metabolic panel which were unremarkable. Fecal occult blood test was positive. Patient was subsequently referred for colonoscopy. Colonoscopy 1 Initial colonoscopy revealed diverticulosis and a five centimeter pedunculated polyp, estimated to be twenty centimeters from the anal verge. Several biopsies were taken from the polyp and it was tattooed. There was inadequate visualization proximal to the sigmoid colon due to poor prep. The colonoscopy was aborted with plans to repeat it after successful preparation. Biopsy of the polyp demonstrated ischemic colitis with focal evidence of ulceration. Colonoscopy 2 Repeat colonoscopy re-demonstrated the large polyp within the sigmoid colon. Due to the polyp size, it was not amenable to endoscopic polypectomy. Despite improved prep, the scope was unable to be advanced to the proximal colon safely because of the polyp size and a tortuous sigmoid colon. Several additional biopsies of the polyp were taken given the concern for carcinoma. The pathology of these biopsies were consistent with a hyperplastic polyp. However, there was still a concern for malignancy given the size of the polyp. Therefore, the patient was sent for imaging that included a CT of the abdomen and pelvis with IV and oral contrast and a chest x-ray. Colorectal surgery was consulted for a segmental colon resection. CT showed focal wall thickening and a nonspecific fatty lesion within the sigmoid colon measuring 2.5 x 1.8 cm. Extensive colonic diverticula were noted without findings of acute diverticulitis. There was no evidence of extracolonic neoplasms on CT or chest x-ray. The decision was made to proceed with segmental resection. Patient underwent laparoscopic hand-assisted low anterior resection. The patient had an uneventful post-operative course and discharged to home post-operative

day three. Pathology revealed a 2 x 2 x 2 cm hyperplastic polyp with submucosal angiolipoma and 13 benign lymph nodes. Additionally, there was a foci of mucosal ulceration secondary to the submucosal angiolipoma pushing toward the surface of the hyperplastic polyp.

Results/Outcome(s): Angiolipomas were first described by John Bowen in 1912 after a patient encounter with multiple subcutaneous lesions. The benign lesions are smooth, often encapsulated, containing various degrees of adipose tissue and blood vessels. These lesions rarely occur in the gastrointestinal tract with less than ten cases reported in the literature to our knowledge. Angiolipomas of the musculoskeletal system have previously been described in young adults; while cases reported in the gastrointestinal tract appear more frequently in the elderly. These intestinal tumors are often associated with abdominal pain, bowel obstruction and rectal bleeding. Surgical excision is the treatment of choice and has shown to have an excellent prognosis when the tumors are completely excised. Due to rarity of angiolipoma, our understanding relies on the few cases previously described and further research is warranted.

Conclusions/Discussion: Angiolipomas of the colon are extremely rare and usually present in the elderly. They often present with rectal bleeding and require complete resection with no role for adjuvant therapy.

CLINICAL STAGING ACCURACY AND THE ROLE OF NEOADJUVANT CHEMORADIOTHERAPY FOR CT3N0 RECTAL CANCER: PROPENSITY SCORE MATCHED NATIONAL CANCER DATABASE ANALYSIS.

P406

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Purpose/Background: While neoadjuvant chemoradiation therapy (nCRT) is largely accepted as standard of care for locally advanced rectal cancer, approach to treatment of patients with clinically staged T3N0 disease

has been increasingly debated. The trials that established this standard of care did not address the fact that the T3N0 subset of patients is considered lower risk for local recurrence, and thus the concern remains that nCRT may be an unnecessary adjunct to proper total mesorectal excision (TME). This study examines the accuracy of clinical staging for cT3N0 rectal cancer as recorded in the National Cancer Data Base (NCDB) and evaluates the role of nCRT in treating these patients.

Methods/Interventions: Clinically staged T3N0M0 rectal cancer patients who received nCRT or proceeded to surgery first between 2004 and 2015 were included in the analysis. Total of 15,843 patient records were identified in the NCDB meeting inclusion criteria. Propensity score matching using the greedy nearest neighbor method was employed to balance the nCRT and surgery-first groups, resulting in 3665 matched pairs. Adjusted overall survival, pathological nodal upstaging and resection margin status were compared.

Results/Outcome(s): Accuracy of clinical staging was poor, with 23% of cT3N0 patients undergoing surgery-first having pathologically positive nodes. Another 16% turned out to have < stage II disease on surgical pathology. The Kaplan-Meier curves for overall survival in matched nCRT and surgery-first groups demonstrated a survival advantage for cT3N0 patients treated with nCRT. 5-year survival for cT3N0 patients receiving nCRT was 71% compared to 65% for patients who proceeded to surgery first. Median overall survival was 9 and 7.8 years ($p < 0.001$) for nCRT and surgery-first groups respectively.

Conclusions/Discussion: Current clinical staging accuracy remains poor nationally, and can result in both undertreatment and overtreatment of cT3N0 rectal cancer. While administering nCRT appears to confer a slight survival advantage over proceeding to surgery first, this strategy must be balanced with the fact that it likely results in overtreatment in ~16% of cases. Until clinical staging accuracy improves nationally, nCRT should remain the standard in treating cT3N0 rectal cancer.

P406 Outcomes in Patients with cT3N0 Rectal Cancer Undergoing Neoadjuvant Chemoradiation vs. Surgery-First Approach

	nCRT (n = 3665)	Surgery-First (n = 3665)	p-value
Pathologic Stage			<0.001
pStage 0	136 (3.7%)	47 (1.3%)	
pStage I	1209 (33.0%)	542 (14.8%)	
pStage II	1457 (39.8%)	2195 (59.9%)	
pStage III	808 (22.0%)	833 (22.7%)	
pStage IV	55 (1.5%)	48 (1.3%)	
R0 Margin	3439 (95.0%)	3378 (93.2%)	0.017
90 Day Mortality	86 (2.4%)	138 (3.8%)	<0.001
5 Year Overall Survival	71%	65%	<0.001
Median Overall Survival	9.0 years	7.8 years	<0.001

nCRT = neoadjuvant chemoradiation therapy

DEVELOPMENT OF RADIOMICS BASED ON NOMOGRAM TO PRECISELY PREDICT CONDITIONAL RISK OF SITE-SPECIFIC RELAPSE FOR STAGE I-III COLON CANCER PATIENTS TREATED WITH RADICAL SURGERY.

P407

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Purpose/Background: Accurate prediction of site-specific relapse risk for stage I-III colon cancer patients remains a challenge and few effective predictive model has been developed. Solely depending on clinicopathologic features do not have a desired level of precision in stratifying patients with distinct risk. The aim of this study was to develop a nomogram model combing radiomics features and clinical characteristics to precisely predict conditional risk of site-specific postoperative recurrence in stage I-III colon cancer patients treated with radical surgery.

Methods/Interventions: We identified 704 patients with colon cancer who had measurable abdomen CT. 648 features were extracted automatically from the annotated CT based on Pyradiomics. there radiomics risk score (RR-score) were generated using minimum redundancy maximum relevance(MRMR) methods for each recurrence site:1,2,3, and the cutoff point of the RR-score to divide the patients into high- and low-risk groups was determined using receiver- operating characteristic curve analysis. Competition risk models were used to determine the association of the RR-score and clinicopathological factors with recurrence free survival (RFS).

Results/Outcome(s): The subdistribution hazard ratio (SHR) of higher RR-score derived from Fine-Gray model is 1.97 for liver metastasis, $p = 0.047$; 1.51 for recurrence of lung metastasis, $p = 0.032$; 3.04 for recurrence of peritoneal metastasis, $p = 0.027$, respectively. The combined model estimated DFS [C-index, 0.77 for liver metastasis; 0.82 for lung metastasis; 0.76 for peritoneal metastasis] better than the RR-score (C-index, 0.76 for liver metastasis; 0.82 for lung metastasis; 0.72 for peritoneal metastasis) or clinicopathological feature alone(C-index, 0.58 for liver metastasis; 0.61 for lung metastasis, 0.64 for peritoneal metastasis).

Conclusions/Discussion: The combined nomogram model developed can precisely predict site-specific recurrence in patients with completely resected colon cancer based on combined nomograms. This prediction tool will be helpful to guide postoperative follow-up plans and therapeutic strategy.

IS MRI ESSENTIAL FOR UPPER RECTAL CANCERS?

P408

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Purpose/Background: Current UK guidelines state that magnetic resonance imaging (MRI) should be offered to all patients with rectal cancer to assess circumferential resection margin involvement; the results can subsequently be used to determine the need for neoadjuvant therapy. However, high rectal cancers (more than 8 cm from the anal verge) arise above the peritoneal reflection and therefore the relationship to circumferential resection margin may be less relevant as the tumour is intraperitoneal.

Methods/Interventions: This is a retrospective study of a prospectively collected database from Oxford University Hospital NHS Trust. All patients diagnosed with rectal cancer from 2015 to 2018 were included and data was collected regarding initial endoscopy findings, MRI scans and histopathology results.

Results/Outcome(s): A total of 250 patients with rectal cancer were identified and 100 patients had high rectal cancer on endoscopic findings (>8cm above the anal verge). 91 % of these patients were assessed by MRI. Out of the 91 patients who received an MRI for high rectal cancers, 87 % proceeded straight to surgery, as it was determined there was no indication for neoadjuvant radiotherapy. The remainder of the patients were palliative due to distant disease

Conclusions/Discussion: MRI for high rectal cancer affected the management of only 11 % of our patients. The majority of patients with high rectal cancer therefore did not have their treatment plan influenced by MRI. This study suggests that selective use of MRI may be maybe a viable option in upper rectal cancer

IS REPEAT MRI IMPORTANT FOLLOWING NEOADJUVANT TREATMENT FOR RECTAL CANCER?

P409

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Purpose/Background: Magnetic resonance imaging (MRI) is an indispensable tool for multidisciplinary teams (MDTs) addressing rectal cancer. It provides anatomical information for surgical planning and allows patients to be stratified into different groups according to the risk of local and distant recurrence. Neoadjuvant chemoradiotherapy has become standard treatment for locally advanced rectal cancer; tumour reduction and even pathologically complete response after chemoradiotherapy (CRT) provide important opportunities to alter the treatment

plan. The purpose of this study was to evaluate whether restaging with MRI altered the management of patients receiving long-course chemoradiotherapy for rectal cancer.

Methods/Interventions: This is a retrospective study of a prospectively maintained database from Oxford University Hospitals NHS Foundation Trust from 2015 to 2018. Data was collected regarding patient demographics, initial radiological staging and MDT discussion, restaging modality, and outcome following restaging with MRI.

Results/Outcome(s): A total of 250 patients with rectal cancer were identified. 109 patients had mid/low rectal cancer on endoscopic findings; all 109 patients received an MRI for staging. 33% (36/109) of these patients received long-course chemoradiotherapy. The average reported distance from the anal verge was 3cm lower on MRI than on flexible sigmoidoscopy. All of our patients were restaged following long-course treatment with MRI. Eight patients had an MRI tumour regression grade (mrTRG) of 1-2. These eight patients (22%) also had a complete clinical response to treatment and have undergone intensive follow-up and deferral of surgery.

Conclusions/Discussion: Of those patients with mid/low rectal cancers who were restaged, 22% had a good clinical and radiological response and avoided progression to immediate surgery. Patients with rectal cancer should therefore be restaged by MRI following long-course chemoradiotherapy, as surgery may be avoided in up to 22% of cases.

A COMPARISON OF CANCER CARE DELIVERY POSTOPERATIVE OUTCOMES AFTER IMPLEMENTATION OF A MOBILE APPLICATION.

P410

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Purpose/Background: With 4 billion users online and 5.1 billion unique mobile users, the climate of patient education and communication continues to evolve, particularly in a multidisciplinary practice such as colorectal cancer care delivery. In order to facilitate optimizing patient experience and improving patient outcomes, a mobile application was used for preoperative surgery preparation and real-time monitoring of post-discharge recovery. This mobile application provided patient responses to postoperative care questions focused on preventable readmission complications. The purpose of this study was to determine the impact of implementation of a mobile application in cancer care surgical patients determined by patient care outcomes, particularly readmission rates and Emergency Department visits within 30 days.

Methods/Interventions: This study is a retrospective cohort study of Enhanced Recovery Pathway colorectal surgery patients with colorectal adenocarcinoma. The

mobile phone application was the intervention. The pre-intervention study period was June 2016 to February 2017, and the post-intervention study period was January 2018 to September 2018. The one-year intervening time was established to be a "ramp in" period for the mobile application. Readmission rates and Emergency Department visits were compared before and after implementation of the mobile application in the cancer care delivery pathway. Comparisons of the primary outcomes were made using chi-squared tests for categorical variables and t-tests for continuous variables.

Results/Outcome(s): There were 60 patients in the pre-intervention group and 93 patients in the post-intervention group. While the pre-intervention group had a higher ratio of men, all other demographics were evenly balanced between the two cohorts (Table 1). The outcomes, while statistically not significant, were improved for the post-intervention cohort on both readmissions (14% vs. 18%) and ED visits (0.16 vs. 0.25 visits per patient). A subset analysis was performed on the post-intervention cohort comparing those who signed up for the application vs. those who did not (Table 3). Although statistically not significant, those who did not sign up were slightly older, more likely to be female, and more likely to be a minority. Additionally, the participating patients improved primary outcomes, with fewer readmissions and ED visits, albeit statistically not significant.

Conclusions/Discussion: Cancer care delivery in the treatment of colorectal cancer patients continues to evolve in the era of increasing mobile technology. The implementation of this mobile application to provide reinforcement in patient education and postoperative monitoring shows improvement in primary outcomes such as readmission rates and ED visits, while underpowered in this study. Whether or not this ongoing study may continue to provide promising advancements in offering clinically significant improvement in patient outcomes will be determined.

Table 1

Demographics				
Variable	Label	Not Offered App (N=60)	Offered App (N=93)	P Value
Sex	Female	22 (36.67%)	42 (45.65%)	0.353
	Male	38 (63.33%)	50 (54.35%)	
Race				> 0.999
	Black	5 (8.33%)	9 (9.78%)	
	Other	1 (1.67%)	1 (1.09%)	
	White	54 (90%)	82 (89.13%)	
Ethnicity	Hispanic	1 (1.72%)	0 (0%)	0.397
	Non-Hispanic	57 (98.28%)	88 (100%)	
Age		65.019 (13.103)	64.676 (13.416)	0.876

Table 2

Outcomes			
Variable	Not Offered App (N=60)	Offered App (N=93)	P Value
Readmission	11 (18.33%)	13 (13.98%)	0.62
Visits	0.25 (0.628)	0.161 (0.398)	0.332

Table 3

Subset Analysis				
Variable	Label	Didn't Sign Up (N=34)	Signed Up (N=59)	P Value
Sex	Female	19 (55.88%)	23 (39.66%)	0.197
	Male	15 (44.12%)	35 (60.34%)	
Race				0.456
	Black	4 (11.76%)	5 (8.62%)	
	Other	1 (2.94%)	0 (0%)	
	White	29 (85.29%)	53 (91.38%)	
Ethnicity	Non-Hispanic	33 (100%)	55 (100%)	NA
Age		65.714 (15.551)	64.078 (12.12)	0.574
Readmissions		7 (20.59%)	6 (10.17%)	0.216
Visits		0.265 (0.511)	0.102 (0.305)	0.057

ANORECTAL MALIGNANT MELANOMA: A RETROSPECTIVE ANALYSIS OF 101 CASES FROM ONE SINGLE CENTER.

P411

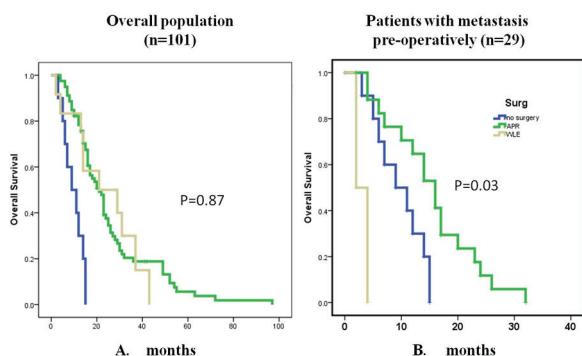
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Purpose/Background: To investigate the prognostic factors for anorectal malignant melanoma (ARMM) in a retrospective cohort.

Methods/Interventions: The clinical and pathological data of ARMM patients who underwent comprehensive treatment from Jan. 2003 to Jan. 2018 were retrospectively collected. The correlation between clinical factors and survival were analyzed by Kaplan-Meier analysis.

Results/Outcome(s): A total of 101 patients (39 male, 62 female) were enrolled. The distribution of stages by *Flach* criteria were: 22.8% (23) stage I, 32.7% (33) stage II, 15.8% (16) stage III and 28.7% (29) stage IV. The estimated rates of 1yr, 2yr and 3yr OS were 73.5%, 30.5% and 14%. Twelve (11.9%) patients underwent wide local excision (WLE), 79 (78.2%) patients had abdominoperineal resection (APR) and 10 (9.9%) patients had non-surgical intervention. *Falch* staging and lesion diameter were independent prognostic factors for OS ($p=0.00$ & $p=0.04$). No significant difference was found between types of surgery (WLE or APR), however, rate of local recurrence was higher after WLE ($p=0.01$). In patients with metastatic disease, APR brought survival benefit ($p=0.03$), compared with no surgery or WLE.

Conclusions/Discussion: *Falch* staging and tumor-size were prognostic factors for OS in anorectal melanoma. No difference of survival was observed between patients underwent APR or WLE.



SURGICAL MANAGEMENT OF HUGE PRIMARY PELVIC RETROPERITONEAL TUMOR: TWO CASES REPORT.

P412

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Purpose/Background: Primary pelvic retroperitoneal tumor (PPRT) derives from the various tissues in retroperitoneal space, which is a rare and challenging condition for the surgeon. Surgical resection is suggested as a critical treatment for PPRT, based on a thorough preoperative evaluation, experienced surgeon and advanced medical equipment. In this article, we present the two cases with huge PPRT.

Methods/Interventions: Case 1. A 23-year-old female had constipation for more than six months and was diagnosed with a pelvic tumor by ultrasonography. Clinical examination revealed the huge hard and fixed tumor located in the lower quadrant of the abdomen. MRI showed the pelvic solidary tumor (12.6*11.3*12.7cm) with the significantly hyperintense signal on enhanced T1 weighted images (Fig1A), which seem to have a close relationship with left sacral foramina (Red Circle). Computed tomographic angiography (CTA) revealed the blood supply of the tumor came from the inferior mesenteric artery and left internal iliac artery (Fig1B. red arrow) and left hydronephrosis and hydronephrosis due to tumor compression. Before resection operation, Two Double J ureteral stents were indwelled into bilateral ureters respectively. Laparotomy was performed. Findings included a pelvic tumor occupied entire pelvic cavity and compressed bladder. Moreover, the tumor was resected completely without adjacent organ injury. Case 2. A 28-year-old male had a sensation of lower abdominal mass for the past one months and was diagnosed with a pelvic tumor by ultrasonography. The tumor located in the lower quadrant of the abdomen was hard and fixed in the abdominal palpation. PET-CT showed a huge tumor (10.5*8.7*13.1cm) with increased metabolism ($SUV_{max}=2.8$) was located in the pelvic cavity and pushed the bladder to the right (Fig 1C). Double J ureteral stents were also placed before resection operation in order to avoid the ureter injury. The external iliac vein was ruptured in the process of mobilizing the conglutination between tumor and iliac vein and then repaired with 5-0 Prolene by a vascular surgeon. Finally, the tumor was resected entirely.

Results/Outcome(s): The blood loss in operation was 500 ml in case 1 and 1800 ml in case 2. Blood transfusion was used in both patients. Both patients had no postoperative complication. Soft diet was resumed at the postoperative 5 days in case 1 and 4 days in case 2. Rivaroxaban as anticoagulation treatment began in case 2 after postoperative 5 days. The female patient discharged after postoperative 9 days while the male patient after 8 days. The pathology revealed a cellular schwannoma in

the female patient and a unicentric Castleman's disease (hyaline vascular) in the male patient. After 2 months and 3 months follow-up for case 1 and case 2 respectively, no signs of recurrence and complication in both patients were found.

Conclusions/Discussion: The surgical management of PPRT required thorough evaluation and multidisciplinary collaboration. The location, relationship with adjacent organ, and blood supply of PPRT should be evaluated by imaging examination. Laparotomy, which generally needs large excision, provides sufficient surgical field to excise the tumor and protect the adjacent organ. A multidisciplinary team, including colorectal surgery, urology surgery, vascular surgery, and gynecology, may be beneficial for the management of PPRT.

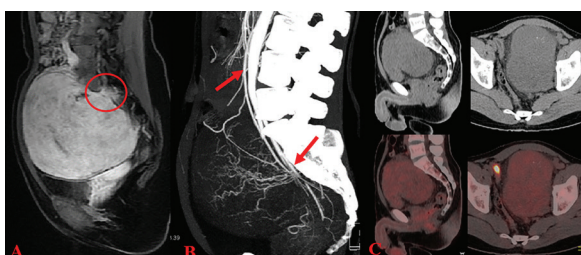


Fig 1: A. PPRT has a close relationship with left sacral foramina on MRI of case 1 (red circle); B. The blood supply on CTA of case 1 (red arrow). C. PPRT seen on PET-CT of case 2.

A NATIONAL ANALYSIS OF SURGICAL AND MINIMALLY INVASIVE TREATMENT PATTERNS FOR EARLY STAGE INVASIVE RECTAL ADENOCARCINOMA FROM 2004 TO 2015.

P413

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Purpose/Background: Treatment patterns for early stage invasive rectal adenocarcinoma change over time and vary across the nation. Evidence has shown that the use of anterior resection (AR) as a sphincter preserving procedure should be utilized for the majority of rectal cancers over abdominoperineal resection (APR). We aim to analyze the adoption of AR over APR and minimally invasive techniques in the United States over the past decade.

Methods/Interventions: Utilizing the National Cancer Database (NCDB), we identified 68,408 cases of Stage I (AJCC 6th Edition) invasive rectal adenocarcinoma from 2004 to 2015. We compared patient characteristics and proportions of those receiving AR to those receiving APR (including total proctectomy/proctocolectomy). Within AR, we compared the proportion of open versus minimally invasive techniques, and laparoscopic versus robotic techniques. To control for differences, logistical regression

was performed to analyze surgical treatment patterns over time and across several clinical strata. A subgroup analysis was performed within those receiving AR to determine patterns of minimally invasive and robotic techniques.

Results/Outcome(s): There are significant differences in Age, Gender, Race, Charlson/Deyo Score, Median Income, Primary Payer, Facility Type, Great Circle Distance, Regional Location, and Surgical Approach between the APR and AR groups ($p < 0.01$). From 2004 to 2005, there were no significant changes in the proportion of patients undergoing APR versus AR ($p = 0.63$). After controlling for the above differences, the odds of undergoing APR versus AR were 1.17 times higher in females compared to males ($p < 0.01$); 0.88 times lower in Blacks compared to Whites ($p = 0.02$); 1.32 times higher in Asians compared to Whites ($p < 0.01$); 0.93 times lower with a Charlson/Deyo score of 1 versus 0 ($p = 0.04$); 1.10 times higher in the highest income quartile compared to the lowest income quartile ($p = 0.04$); 1.68, 1.38, and 1.41 times higher in those with Private Insurance ($p < 0.01$), Medicare ($p < 0.01$), and Other Government ($p = 0.03$) insurance, respectively, compared to the uninsured; 1.14 times higher in Integrated Network Cancer Programs compared to Community Cancer Programs ($p = 0.04$); 0.91 and 0.76 times lower with those living 26-50 miles ($p = 0.02$) and > 50 miles ($p < 0.01$) from the facility, respectively, compared to those living 0-25 miles from the facility; 0.78 times lower in the West North Central region compared to New England ($p < 0.01$); and 1.17 times higher in the West South Central region versus New England ($p = 0.04$). There remained no significant differences in the proportion of patients undergoing APR versus AR. From 2010 to 2015, there were significant increases in minimally invasive and robotic techniques for AR ($p < 0.01$). On subgroup analysis of AR, the odds of receiving a minimally invasive versus open technique were 0.56 times lower with Charlson/Deyo score of 3 compared to 0 ($p = 0.03$); 1.41 times higher in the second highest income quartile ($p < 0.01$) and 1.58 times higher in the highest income quartile ($p < 0.01$) compared to the lowest income quartile; and 1.66 times higher with Private Insurance compared to uninsured ($p = 0.02$). Compared to Community Cancer Programs, the odds of a minimally invasive approach were 1.74, 1.71, and 1.81 times higher at Comprehensive Community Cancer Programs ($p < 0.01$), Academic/Research Programs ($p < 0.01$), Integrated Network Cancer Programs ($p < 0.01$). Compared to 2010, the odds of a minimally invasive approach increased from 1.45 in 2011 ($p < 0.01$) to 3.07 in 2015 ($p < 0.01$). On further subgroup analysis of minimally invasive AR, the odds of receiving robotic versus laparoscopic surgery was 1.01 times higher for each year of age ($p = 0.05$); 1.72 times higher in the second highest income quartile compared to the lowest quartile ($p = 0.02$); 2.11 and 2.28 times higher at Comprehensive Community Cancer Programs ($p = 0.02$) and Academic/Research Programs ($p = 0.01$), respectively,

compared to Community Cancer Programs. Compared to 2010, the odds of undergoing robotic versus laparoscopic AR increased from 2.03 times higher in 2013 ($p < 0.01$) to 3.22 times higher in 2015 ($p < 0.01$).

Conclusions/Discussion: After controlling for differences, the odds of patients undergoing APR versus AR in the United States have not significantly changed from 2004 to 2015 and remains high. This suggests the adoption of AR over APR is delayed, despite evidence of improved functional outcomes. Over the same period, the use of minimally invasive and robotic techniques have increased. For even Stage I disease, an increase in more technically advanced techniques has not translated into an increase in sphincter preserving procedures. Efforts should be made to direct the growing use of technically advanced techniques towards increasing the use of sphincter preserving procedures. Centralized centers of excellence and standardized care might facilitate the adoption.

A CASE OF DISSEMINATED PERITONEAL SCHISTOSOMIASIS MIMICKING CARCINOMATOSIS IN A PATIENT WITH COLON CANCER.

P414

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Purpose/Background: Movement around our globe is becoming easier and more commonplace. In 2016, approximately 1.5 million foreign-born individuals immigrated to the United States, and in 2017, there were nearly 80 million international visitor arrivals to the United States. With the movement of such massive numbers of people, we can expect to encounter medical diagnoses here in the United States previously thought of as only occurring elsewhere.

Methods/Interventions: This is a 67 year old male from the Philippines. He had a history of schistosomiasis treated originally more than 20 years ago. 5 years earlier on routine screening colonoscopy he was told that a colon cancer was found. A few days later however the biopsies came back as schistosomiasis eggs. He was treated again at that time. He presented again for routine screening colonoscopy and a mid sigmoid adenocarcinoma arising in a tubular adenoma was found. He had a negative metastatic workup and was scheduled for an elective robotic sigmoid colectomy. Upon initial exploration of the abdomen, multiple nodular implants were found within the pericolic fat and serosa of the sigmoid colon adjacent to the tattooed lesion. Further exploration showed that these whitish implants were additionally seen scattered along the mesentery to the sigmoid colon and throughout the rest of the abdomen concerning for carcinomatosis (image 1). The implants were biopsied and sent for frozen section. The frozen section returned fibrous tissue with parasitic eggs

consistent with schistosomiasis and no tumor. The surgery was completed, and the patient underwent a successful resection of the sigmoid colon cancer. Postoperatively, the schistosomiasis was treated with praziquantel after consultation with an infectious disease specialist.

Results/Outcome(s): The patient was discharged on POD #3 uneventfully. Final Pathology: Invasive moderately to poorly differentiated adenocarcinoma in association with tubular adenoma with lymphatic invasion, one of twenty-seven lymph nodes is positive for tumor, AJCC stage (8th ed): pT2 N1a. **Parasitic eggs (schistosoma) extensively involve colonic wall and replace most lymph nodes.**

Conclusions/Discussion: This is a patient with colon cancer in whom peritoneal carcinomatosis was immediately suspected upon identification of peritoneal implants, however, the implants were found to be parasitic which was an unexpected diagnosis. Schistosomiasis is a common disease worldwide, affecting over 200 million people, however, it is historically rarely encountered or reported in the United States. There have been a small number of case series published in endemic areas (China, Japan) implicating schistosomiasis in the development of colon cancer. To our knowledge this is the first case report of a colorectal cancer associated with schistosomiasis in the United States. In today's "global world", diagnoses that were previously rarely encountered in the United States such as parasitic infections or miliary tuberculosis are becoming more commonplace and may mimic more frequently encountered diagnoses such as carcinomatosis. It is important for the surgeon to bear this in mind when an unanticipated or unexplained finding is made.



Schistosomal eggs near the tattooed colon cancer and along the mesentery

P413 Logistical Regression Analysis of Surgical Treatment Patterns

	APR versus AR		MIS versus Open		Robotic versus Laparoscopic	
	Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value
Age	1.00	0.83	0.99	0.11	1.01	0.05
Gender: Male	--	--	--	--	--	--
Female	1.17	<0.01	1.15	0.06	0.91	0.44
Ethnicity: Non-Hispanic	--	--	--	--	--	--
Hispanic	0.95	0.43	1.23	0.20	0.94	0.81
Unknown	0.99	0.92	0.91	0.65	1.08	0.83
Race: White	--	--	--	--	--	--
Black	0.88	0.02	0.95	0.70	0.98	0.95
American Indian/Native American	0.85	0.48	1.26	0.68	--	--
Asian	1.32	<0.01	1.38	0.13	1.81	0.07
Hawaiian/Pacific Islander	1.52	0.32	2.27	0.38	--	--
Other	0.93	0.64	0.58	0.21	2.27	0.27
Unknown	0.98	0.89	1.43	0.41	1.35	0.64
Charlson/Deyo Score: 0	--	--	--	--	--	--
1	0.93	0.04	1.02	0.86	1.00	1.00
2	0.97	0.59	0.80	0.21	0.73	0.33
3	0.87	0.19	0.56	0.03	1.13	0.81
Median Income Quartile: <\$38,000	--	--	--	--	--	--
\$38,000-\$47,999	1.00	0.99	1.03	0.81	1.37	0.22
\$48,000-\$62,999	1.01	0.83	1.41	<0.01	1.72	0.02
\$63,000+	1.10	0.04	1.58	<0.01	1.21	0.42
Primary Payer: Not Insured	--	--	--	--	--	--
Private Insurance	1.68	<0.01	1.66	0.02	1.47	0.36
Medicaid	1.12	0.24	1.16	0.543	1.74	0.26
Medicare	1.38	<0.01	1.51	0.06	1.42	0.41
Other Government	1.41	0.03	2.05	0.06	1.80	0.36
Unknown	1.21	0.16	0.74	0.45	1.40	0.67
Facility Type: Community Cancer Program	--	--	--	--	--	--
Comprehensive Community Cancer Program	1.02	0.69	1.74	<0.01	2.11	0.02
Academic/Research Program	1.00	0.95	1.71	<0.01	2.28	0.01
Integrated Network Cancer Program	1.14	0.04	1.81	<0.01	1.84	0.10
Great Circle Distance: 0 to 25 miles from facility	--	--	--	--	--	--
26-50 miles from facility	0.91	0.02	1.05	0.68	1.19	0.34
< 50 miles from facility	0.76	<0.01	1.14	0.21	1.02	0.90
Location: New England	--	--	--	--	--	--
Middle Atlantic	1.08	0.24	1.04	0.82	1.27	0.40
South Atlantic	1.06	0.38	0.75	0.10	1.17	0.59
East North Central	0.92	0.18	0.87	0.40	1.85	0.03
East South Central	1.00	0.99	0.69	0.08	1.32	0.45
West North Central	0.78	0.01	0.76	0.14	1.60	0.12
West South Central	1.17	0.04	0.93	0.70	0.60	0.15
Mountain	1.19	0.05	0.90	0.68	1.59	0.25
Pacific	1.11	0.13	0.89	0.52	1.36	0.31
Year of Diagnosis: 2004	--	--	--	--	--	--
2005	1.05	0.48	--	--	--	--
2006	1.05	0.44	--	--	--	--
2007	1.01	0.85	--	--	--	--
2008	1.06	0.42	--	--	--	--
2009	1.13	0.06	--	--	--	--
2010	1.02	0.80	--	--	--	--
2011	1.02	0.13	1.45	<0.01	1.18	0.56
2012	1.10	0.72	2.00	<0.01	1.66	0.06
2013	1.07	0.16	2.25	<0.01	2.03	<0.01
2014	1.06	0.30	2.88	<0.01	2.49	<0.01
2015	1.91	0.35	3.07	<0.01	3.22	<0.01

ONCOLOGICAL AND SURVIVAL OUTCOMES OF IMMEDIATE NONOPERATIVE MANAGEMENT AFTER CHEMORADIOOTHERAPY FOR LOCALLY ADVANCED RECTAL CANCER: APPRAISAL OF CLINICAL COMPLETE RESPONSE.

P415

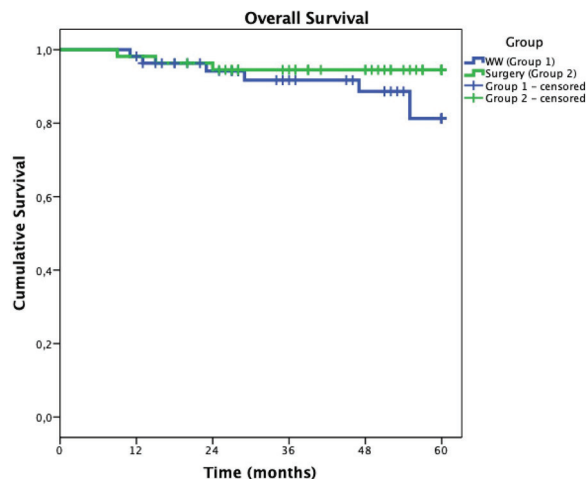
G. Cotti, R. Pandini, O. Freitas Melro Braghiroli, C. Nahas, A. Imperiale, C. Marques, U. Ribeiro Junior, S. Nahas, L. Bustamante, R. Azambuja, C. Ortega, B. Salvajoli, P. Hoff
São Paulo, Brazil

Purpose/Background: There is an increasing acceptance in organ sparing strategies in patients with rectal cancer treated with neoadjuvant chemoradiotherapy (nCRT). The main strategies in this setting are the adoption of a watch and wait approach and/or the use of local excision instead of a total mesorectal excision (TME). The purpose of this study was to analyze the long term results of this approach and to compare the outcomes with patients that underwent nCRT followed by a TME and achieved a pathological complete response.

Methods/Interventions: Retrospective review of patients with rectal cancer treated with nCRT in a single institution between 2008 and 2017. Patients that were found at restage to have a complete or near complete clinical response that underwent a watch and wait (group 1, N = 55) strategy (with or without a full thickness local excision) were compared to those that received nCRT followed by a TME and were found to have a pathological complete response (group 2, N = 55).

Results/Outcome(s): There were 110 patients, mean age 62.4 (SD 12.6) years and 58.2% females. Mean follow-up was 44.9 months (SD 16.4). Mean distance to anal verge was 4.0cm (SD 2.4) in Group 1 vs 4.8cm (SD 2.6) in Group 2. Patients presented with comparable initial staging, although group 2 patients had a higher incidence of mesorectal fascia invasion (15.4 vs 23.6%), lateral pelvic lymph-node metastasis (3.8 vs 16.4%), and extramural venous invasion (13.5 vs 27.3%). Restaging occurred initially at mean 8.8 weeks (SD 3.3) after nCRT. MRI TGR1 was achieved in 84.3% (Group 1) vs 37.3% (Group 2) of the patients. Group 1 included 50 patients from a watch and wait approach and 5 patients that were submitted to full thickness local excision after nCRT (all patients were ypT0, none of them recurred). 16 patients (29,1%) of Group 1 developed a tumor regrowth: 13 underwent salvage surgery, 1 patient did not undergo salvage surgery (a 90-year old fragile lady) and 2 patients were recently diagnosed with local regrowth and are scheduled to sphincter-sparing surgery. Distant metastasis occurred in 5.5% in both groups and 5 year overall survival was 87.3% vs 94.5%, with no statistical difference on survival analysis ($p = 0.165$, log-rank test).

Conclusions/Discussion: Organ sparing strategies in patients with rectal cancer treated with nCRT appears to offer acceptable results, especially in patients that achieved a clinical complete response despite the risk of local regrowth. It seems reasonable that physicians should be encourage to discuss these strategies with their patients.



LARGE CELL NEUROENDOCRINE CARCINOMA (LCNEC) OF THE COLON ARISING FROM A TUBULOVILOUS ADENOMA: A CASE REPORT.

P416

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Purpose/Background: L.S. is a 66-year-old man found to have a 4cm mass in the distal transverse colon on a diagnostic colonoscopy performed for occult anemia. Biopsy of the mass showed incomplete removal of a tubulovillous adenoma without dysplasia. He was referred to our surgery clinic and scheduled for a partial colectomy.

Methods/Interventions: Pathology revealed two 0.5 cm foci of large cell neuroendocrine carcinoma within a background of tubulovillous adenoma with high-grade dysplasia. The LCNEC was poorly-differentiated (G3) with invasion of the submucosa (T1) and involvement of 1 of 8 lymph nodes (N1). Lymphovascular invasion was present.

Results/Outcome(s): Given these findings, the patient was taken back for additional resection to increase lymph node yield with 7 additional nodes found, all negative for malignancy. Preoperative imaging was not available, however; post-operative staging CT did not show any evidence of metastatic disease. His case was presented at multidisciplinary tumor board, and given the stage of his disease, adjuvant chemotherapy with cisplatin and etoposide was recommended, which he began.

Conclusions/Discussion: Neuroendocrine tumors (NET) are a heterogeneous group of neoplasms arising from neuroectodermal cells. The World Health Organization (WHO) divides NET into well- and poorly-differentiated classifications. Well-differentiated NET include low- and mid-grade (G1 and G2) tumors, whereas poorly-differentiated NET (high-grade, or G3) are termed neuroendocrine carcinoma (NEC) (1). There are small and large cell (LCNEC) types. The incidence of NET is roughly 5 cases per 100,000 in the general population. NET in the gastrointestinal tract account for 2% of GI malignancies, with the majority being well- to moderately-differentiated (2). NEC are extremely rare and represent less than 1% of all colorectal malignancies (3). Vascular, lymphatic, and perineural invasion, as well as lymph node metastases, are often found at diagnosis. In the case of metastatic disease associated with NEC, platinum-based chemotherapy is generally indicated (4). The majority of metastases occur to the liver and lungs, however, there have been reports of LCNEC presenting with peritoneal carcinomatosis (5). Generally, most NET have a better prognosis than conventional adenocarcinomas, however, colorectal NEC is a highly-malignant subgroup with a very poor prognosis (median survival 4-16 months) (6). The treatment of choice remains oncologic surgical resection for all suitable patients. Although extremely rare, colorectal LCNEC have been identified in synchronicity with adenomas and adenocarcinomas of the colon (7,8). Similarly, NEC coexisting with adenomas have been identified on endoscopy throughout the GI tract (9,10). In the case of our patient, two foci (0.5 cm) of LCNEC arose from a 6.5 cm tubulovillous adenoma with high-grade dysplasia in the transverse colon. There are several theories that attempt to explain this relationship: 1) Mixed tumors are a neuroendocrine phenotype of dedifferentiated adenocarcinoma (11); 2) These tumors originate from a common multipotent stem cell, then simultaneously differentiate into glandular or neuroendocrine lineages (7); or 3) A common genetic alteration predisposes an individual to the development of both tumor types (8). More work is needed to delineate the true pathogenesis of colorectal tumors with concurrent neuroendocrine and adenomatous pathology. There are no agreed-upon management guidelines for colorectal NEC, although given its highly aggressive nature, standard oncologic resection and adjuvant chemotherapy are generally recommended for patients with resectable disease.

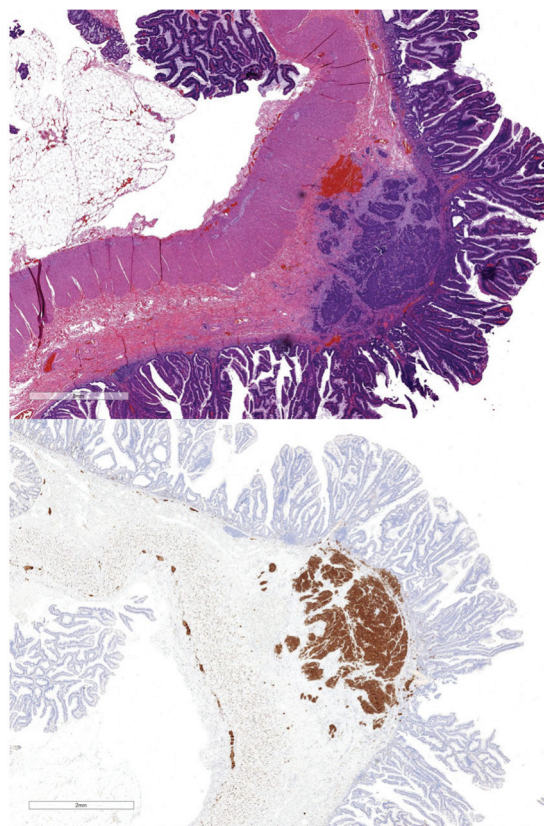


Figure 1: Synaptophysin demonstrates strong cytoplasmic positivity. The neoplasm forms nests of cells with vesicular chromatin and prominent nucleoli; no gland differentiation.

USE OF SERUM HEMATOLOGICAL PARAMETERS AND LIPID PROFILE AS A PROGNOSTIC TOOL IN RECTAL CANCER.

P417

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Purpose/Background: Circulating immune cells in peripheral blood are important elements in the tumor microenvironment. It has been found that thrombocytosis, neutrophilia and lymphocytopenia are prognostic indicators in various neoplastic pathologies. On the other hand, lipid imbalance has been documented in several types of cancer, including colorectal cancer (CRC). Elevated serum cholesterol levels have been linked to an increased risk of adenomas and CRC. In the present study we pretend to determine the prognostic utility of serum hematological parameters and lipid profile in Mexican patients with rectal cancer.

Methods/Interventions: A cross-sectional, analytical study was carried out in which 54 consecutive patients with diagnosis of rectal cancer confirmed by histopathology were included. The demographic, clinical, and biochemical data of each patient were collected. The indexes:

neutrophil/lymphocyte (NLR), platelet/lymphocyte (PLR), eosinophilic/neutrophile (ENR), eosinophilic/lymphocyte (ELR), low density lipoprotein (LDL)/high density lipoprotein (HDL), LDL/cholesterol (Chol), HDL/Chol and Triglycerides (Trig)/Chol were calculated using the serum hematological parameters and lipid profile of rectal cancer patients reported at the diagnosis of the disease. Descriptive statistics was used for the presentation of the variables. The non-parametric Mann-Whitney U tests were used to compare two groups and Kruskal-Wallis for the comparison of three or more groups. Spearman's r was used to quantify the correlation between the variables. The statistical significance was determined with a value of $p < 0.05$. The statistical package SPSS version 23.0 was used.

Results/Outcome(s): Of the patients included, the gender was similarly distributed, with an age of 55.5 ± 12.2 years (range 30 - 90 years). The average BMI was 25.21 ± 4.38 . The risk of malnutrition based on the CONUT score was normal in 27.8% of cases, mild in 38.9%, moderate in 25.9% and severe in 7.4%. 7.4% of the patients were clinical stage (CE) II, 61.1% were ECIII and 31.4% were CE IV. 62.9% of the patients presented the tumor in the lower rectum and 37.03% in the middle rectus. 77.7% of the patients had undergone surgical treatment, be it emergency, definitive or palliative. Of these, 16.6% had postsurgical complications and 12.2% required at least one reoperation. Of the patients who received neoadjuvant, 28% presented a pathological response. The 7.40% presented recurrence after the adjuvant. When calculating the indexes described, we found that there was an association and positive correlation between patients at risk of malnutrition due to CONUT score and a higher INR and PLR ($p = < 0.001$, in both cases). The INR and PLR showed association and positive correlation with the need for surgical reoperation ($p = 0.02$ and $p = 0.009$, respectively) and the PLR was associated and had a positive correlation with the post-surgical complications ($p = 0.02$). The ENR was found to be associated and with a negative correlation with the location of the lower rectum vs. the middle rectus tumor ($p = 0.03$). When calculating the lipid indexes described, we found that there was an association and positive correlation between a higher Trig/HDL index and an age over 45 years ($p = 0.03$), as well as there was statistically differences in patients who presented a response to neoadjuvant ($p = 0.03$) and post-surgical complications ($p = 0.03$). The LDL/Chol index showed association and negative correlation with early stages of CEI-IIvsCEIII-IV ($p = 0.02$), and we observed statistically differences between the degree of tumor infiltration (T1-T4) ($p = 0.03$) and invasion of lymph nodes N (+) vs N (-) ($p = 0.04$). A higher LDL/HDL index was found associated with post-surgical complications.

Conclusions/Discussion: Our findings suggest that the NLR and PLR indices could be considered a useful tool in the nutritional screening and post-surgical outcome of

patients with rectal cancer. While the lipid profile could be involved in the prognosis and response to treatment of these same patients. Both methods are simple, cheap and available in most hospital centers. However, more studies are needed to support our results.

COMPARATIVE STUDY OF AIR TEST AND METHYLENE BLUE PERFUSION TEST IN THE DETECTION OF THE QUALITY OF ANASTOMOSIS IN LAPAROSCOPIC RECTAL CANCER EXCISION (DIXON).

P418

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Purpose/Background: Background: Anastomotic leakage (AL) is a major source of morbidity and mortality after colorectal resection. Prolonged duration of hospital stay, poor oncologic outcomes, and increased mortality have all been associated with AL. Colorectal anastomotic dehiscence, surgical technique may be the significant cause. Intraoperative anastomotic testing can check the integrity of anastomosis, and meanwhile allow repair at the time of surgery. **Purpose:** To investigate the feasibility and safety of air test (AT) and methylene blue perfusion test (MBPT) to detect the quality of the anastomosis in laparoscopic rectal cancer excision (Dixon), and compare the two approaches.

Methods/Interventions: Method: AT is performed by filling the pelvis with saline solution and insufflating the rectum with air through a size 22G balloon catheter (Foley, Figure 1). MBPT is carried out by surrounding clean sponges around anastomosis and injecting methylene blue solution into the rectum as like as AT (Figure 2). The balloon catheter connect manometer, ensuring the pressure in rectum can reach 40cm H₂O during AT and MBPT. The presence of air bubbles and overt blue-stained spillage indicate anastomotic leaks which are resolved during surgery. All 80 patients undergoing laparoscopic rectal excision received both AT and MBPT intraoperatively in a randomized fashion. The integrity of the anastomosis, postoperative vital sign, blood examination, drainage and postoperative imaging were analyzed.

Results/Outcome(s): Results: All 80 patients received both tests successfully with no adverse event. Level 1 MBPT (negative, Figure 3A) was detected in 48 cases, level 2 MBPT (punctiform dye, Figure 3B) in 19 cases, level 3 MBPT (schistose dye, Figure 3C) in 13 cases. No level 4 MBPT (methylene blue effusion, Figure 3D) was observed. Level 1 AT (negative) was detected in 64 cases, Level 2 AT (single small air bubble, Figure 4A) in 9 cases, Level 3 AT (continuous small air bubble and single big bubble, Figure 4C) in 7 cases. No Level 4 AT (continuous big air bubble, Figure 4D) was founded. Six cases were diagnosed with postoperative anastomotic leakage (6/80, 7.5%), of

which 5 cases were Grade B (ISREC definition and grading proposed by the international study group of rectal cancer in 2010). The testing results were: Level 1 AT, Level 3 MBPT; Level 2 AT, Level 3 MBPT; Level 1 AT, Level 1 MBPT; Level 1 AT, Level 1 MBPT; Level 1 AT, Level 1 MBPT of the 5 patients, respectively. One case was Grade C (ISREC definition and grading), of which both two tests were negative. The positive rate of MBPT is superior to AT (the McNemar testing, $P < 0.01$). A χ^2 test was used to assess baseline differences in categorical values ($P > 0.05$). Univariate and multivariate logistic regression analyses were performed to study positive intraoperative test for patient- and treatment-related factors ($P > 0.05$), using SPSS Statistics for Windows version 23 (IBM Corp, Armonk, NY).

Conclusions/Discussion: **Conclusion:** The two intraoperative tests are both technically feasible and safe. Compared to AT, MBPT has the advantage of localizing the leak site with a higher positive, and represent a promising standardized approach for intraoperative test of the anastomosis quality.

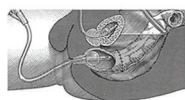


Figure 1: Air testing (Davies AH. *Ann R Coll Surg Engl*. 1988 Nov;70(6):345-7.)

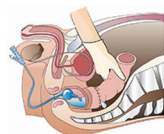


Figure 2: Methylene blue perfusion testing (Chen CW. *Tech Coloproctol*. 2013 Oct;17(5):579-83. doi: 10.1007/s10151-012-0910-x. Epub 2012 Oct 2)

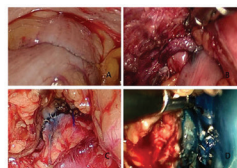


Figure 3: A: Level 1 MBPT(negative); B: Level 2 MBPT (punchform dye); C: Level 3 MBPT(schistosae dye); D: Level 4 MBPT(methylene blue effusion)

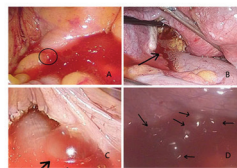


Figure 4: A: Level 1 AT(negative); B: Level 2 AT(single small air bubble); C: Level 2 AT(continuous small air bubble); D: Level 4 AT(continuous big air bubble)

CAN CLINICAL-CR PREDICT PATHOLOGIC-CR AFTER NEOADJUVANT CHEMOTHERAPY? —A PRIMARY STUDY ON RELATIONSHIP BETWEEN CLINICAL FACTORS AND PCR.

P419

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Purpose/Background: Clinical complete response (cCR) of rectal cancer after neo-adjuvant radiation and chemotherapy does not consistently predict pathologic complete response (pCR). Here, we assess whether cCR after neoadjuvant chemotherapy without radiation can accurately predict pCR.

Methods/Interventions: 134 colorectal patients having neo-adjuvant chemotherapy and radical resection surgery were studied retrospectively. The neoadjuvant protocol was CapeOx for the first cycle followed by three cycles of

CapeOx combined with Apatinib. Clinical response was assessed using colonoscopy and MR. pCR was assessed as tumor regression grade (TRG) – 0.

Results/Outcome(s): cCR was observed in 21 patients (16.80%) and pCR in 9 patients (6.71%) with all pCR patients having cCR. cCR patients were compared with vs without pCR for CEA (median 2.07 [range 0.56-64.15] vs 4.63 [0.56-64.15], $P < 0.05$), tumor location (1 [0-18] cm vs 7 [0-90] cm, $P < 0.05$), pretreatment T stage - T3 (3 vs 5), T4a (3 vs 41), T4b (1 vs 28), $P = 0.014$, and pretreatment N stage - N0 (5 vs 21), N1 (0 vs 25), N2 (0 vs 14), $P = 0.021$. By logistic regression, pretreatment T and N stage were significant factors predicting pCR after neo-adjuvant chemotherapy.

Conclusions/Discussion: Higher T and N stage after neo-adjuvant chemotherapy negatively affects prediction of pCR in patients with cCR. Further study is needed to improve prediction of pCR after cCR from neo-adjuvant chemotherapy.

IMPACT OF PNI (PROGNOSTIC NUTRITIONAL INDEX) IN COLORECTAL CANCER AS A PREDICTOR FOR POST OPERATIVE MORBIDITY AND MORTALITY IN OPEN, LAPAROSCOPIC AND ROBOTIC SURGERIES - A SOUTH ASIAN PERSPECTIVE.

P420

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Purpose/Background: PNI has been shown to be an important factor associated with post operative morbidity and mortality in colorectal cancer surgeries. However, there is not sufficient literature regarding the role of PNI in minimal invasive surgeries. This study aims to evaluate whether PNI is associated with post operative morbidity following open, laparoscopic and robotic colorectal surgeries.

Methods/Interventions: This is a retrospective analysis of a prospectively maintained database from a tertiary care cancer centre in South Asia. All curative intent colorectal cancer resections performed between January 2014 till December 2017 were included. Onodera's PNI was calculated for all patients. Parameters studied were post operative hospital stay and 30 day postoperative morbidity and mortality among the three categories of open, laparoscopic and robotic resections. Postoperative complications were categorized as per Clavien Dindo classification.

Results/Outcome(s): A total of 484 cases were included in this study of which 134 were laparoscopic, 230 were open and 120 were robotic surgeries. The median PNI was determined to be 46.12 (14.15 – 81). Overall, PNI was found to be significantly associated with post operative morbidity in all the colorectal cancer surgeries ($p = 0.049$).

The association of PNI with morbidity was found to be significant only in open surgeries ($p = 0.032$) and not in laparoscopic and robotic surgeries. PNI was also found to be significantly associated with post operative morbidity in colonic surgeries ($p=0.001$) as compared to rectal surgeries. When all rectal cancer patients with low PNI were analyzed, there was no statistically significant association between the type of surgery performed, whether open, laparoscopic or robotic and the grade of complication ($p=0.828$). However, the postoperative hospital stay had a significant inverse correlation with the preoperative PNI value in robotic surgery patients ($p=0.033$, correlation coefficient = -0.194)

Conclusions/Discussion: Rectal cancer patients with low PNI may be subjected to open, laparoscopic or robotic surgeries without any change in the complication risk. However, colorectal cancer surgery patients in general and robotic surgery patients in specific, having a low PNI value, have a longer postoperative hospital stay.

INTESTINAL INTUSSUSCEPTION IN ADULT, AN UNUSUAL CASE REPORT.

P421

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Purpose/Background: Intussusception is a rare etiology in the practice of the general surgeon, being more common in the age group up to 2 years. In adults, it appears in a frequency of 1 to 5% around 50 years.

Methods/Interventions: CASE REPORT: LI, female, 47 years old, admitted to the emergency room of a hospital with diffuse abdominal pain and vomiting for 2 days. This is the third time she returns to the service, presenting worsening of the symptom. She denies enterorrhagia and fever. She denies comorbidities but reports that 26 years ago she performed Ventricular-Peritoneal Derivation without subsequent follow-up. In the physical examination, the abdomen is less distended, RHA increased, diffuse

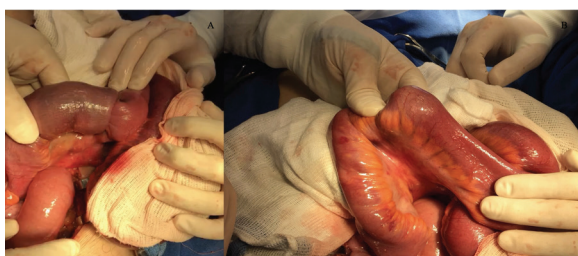
P419

	overall dataset (n=134)	pCR (n=9)	Non-pCR (n=125)	logistic regression P-value	correlation P-value	correlation coefficient
BMI[m/kg ²]	median(range) 23.34(14.52-33.91)	median(range) 25.92(19.43-28.30)	median(range) 23.03(14.52-33.91)	0.432	0.225	-0.106
Age[years]	median(range) 59(25-75)	median(range) 54(33-74)	median(range) 59(25-75)	0.243	0.743	0.029
Gender[F/M]	38(28.36%)/ 96(71.64%)	4(44.44%)/ 5(55.56%)	34(27.20%)/ 91(72.80%)	0.243	0.445	0.096
Tumor location[cm]	median(range) 6.5(0-90)	median(range) 1(0-18)	median(range) 7(0-90)	0.172	0.031	0.187
CEA value[ng/ml]	median(range) 4.25(0.42-514.50)	median(range) 2.07(0.56-64.15)	median(range) 4.63(0.56-64.15)	0.452	0.042	0.176
CEA normalization[Fall to normal value/ Not to normal value]	33(24.63%)/ 101(75.37%)	2(22.22%)/ 7(77.78%)	31(24.80%)/ 94(75.20%)	0.154	1	0.015
Clinical response [Complete clinical response/ Non-complete clinical response]	30(22.39%)/ 104(77.61%)	9(100.00%)/ 0(0.00%)	21(16.80%)/ 104(83.20%)	<0.001	<0.001	0.5
Pretreatment T stage[T3/T4a/T4b]	8(9.88%)/ 44(54.32%)/ 29(35.80%)	3(42.86%)/ 3(42.86%)/ 1(14.28%)	5(6.76%)/ 41(55.41%)/ 28(37.83%)	0.043	0.014	0.345
Pretreatment N stage[N0/N1/N2]	26(40.00%)/ 25(38.46%)/ 14(21.53%)	5(100.00%)/ 0(0.00%)/ 0(0.00%)	21(35.00%)/ 25(41.67%)/ 14(23.33%)	0.005	0.021	0.354

palpation pain mainly in the lower right quadrant, with palpable mass in this quadrant. Computed Tomography (CT) of the abdomen was performed, showing an image of ileocolic intussusception. The exploratory laparotomy was indicated, with the reduction of ileocolic intussusception, absence signs of suffering of the intestinal loops, and a palpable tumor 20 cm from the ileocecal valve. Opposed by enterotomy in the contra-mesenteric face, showing a lesion of approximately 2.5 cm in diameter, regular and of submucosal appearance. Restrained the lesion with a linear stapler and performed an enterorrhaphy. On the 3rd postoperative day (PO), patient presented worsening of pain in the region of the surgical wound (SW), which was showed with a secretion of blood and pus and surrounding cellulite. Antibiotic therapy was started with cirprofloxacin and metronidazole and withdrawn of one point for better drainage of secretion, which ceased at the 8th PO. She was discharged in the 10th PO with clean SW and absence of erythema. Anatomopathological material showed ulcerated chronic ileitis with presence of inflammatory component with large numbers of neutrophils. Faced with the possibility of neoplastic lesion, a lamina revision was performed, which confirmed the diagnosis. In the ambulatory follow-up 2 months after the surgery, she did not present any intercurrent and is waiting for a colonoscopy.

Results/Outcome(s): The treatment is surgical and there is controversy between block resection and more conservative resection. In the case of the patient presented in this case report, it was chosen to resection only the neof ormation that was well delimited, without enterectomy, due to the intraoperative findings.

Conclusions/Discussion: Intussusception as a cause of acute obstructive abdomen in adults that appears at a frequency of 1 to 5% near at the fifth decade of life. The most common etiologies include adhesions, GIST and Meckel's diverticulum, while pathophysiology involves a neof ormation that functions as a traction element for intestinal invagination. This can evolve to ischemia, necrosis and perforation if left untreated. The clinical picture and physical examination in adults are not very specific, showing signs and symptoms of an obstructive condition. Its diagnosis is suggested by an acute abdomen x-ray, which is not very specific, and the USS and CT of the abdomen are shown as the most suggestive signs of intussusception (target signal).



COLORECTAL CANCER PRESENTS AT ADVANCED AGE FOR WHITE FEMALE POPULATION IN THE STATE OF PENNSYLVANIA.

P422

J. Singh¹, N. Ahuja²

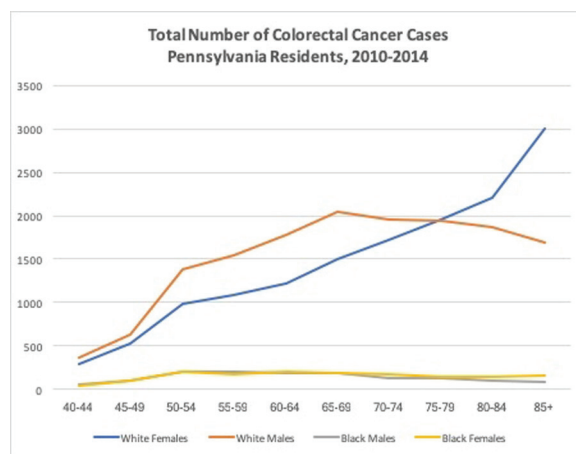
¹Baltimore, MD; ²New Haven, PA

Purpose/Background: Screening colonoscopy for Colorectal cancer is only recommended in selective patients after the age of 75 years and alternative screening methods are limited. The goal of this study was to examine the incidence and burden of Colorectal Cancer in this population for the State of Pennsylvania.

Methods/Interventions: Incident Colorectal Cancer cases were identified from Pennsylvania Department of Health, Health Statistics website. Age wise distribution was assessed for Colorectal Cancer.

Results/Outcome(s): 34,324 cases of invasive Colorectal Cancer were reported in state of PA from 2010-2014 for all age groups. Amongst white females, 48.3% of cases occurred after the age of 75 years (n=7156), compared to 35.4% in white males (n=5499), 28.3% in black females (n=447), and 22.2% in black males (n=318). Though, age specific incident rates per 100,000 population in this age group (75 year or more) were higher for males compared to females (316 vs 256), and whites compared to blacks (280 vs 248). For this age group, incident of distant metastatic disease was 18.2% for White population, 22.3% for Black population (p<.001).

Conclusions/Discussion: A high percentage of Colorectal Cancer cases present after the age of 75 years, especially in the white female population of The State of Pennsylvania. Although, screening colonoscopy is recommended only on selective basis after the age of 75 years, alternative screening strategies should be encouraged to target this patient population.



COMPARISON OF FDG PET/CT AND CECT IN THE EVALUATION OF POSTOPERATIVE COLORECTAL CARCINOMA PATIENTS WITH ELEVATED SERUM CEA LEVELS.

P423

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Purpose/Background: In this retrospective analysis, our aim was to compare the role of FDG PET/CT and CECT in the detection of recurrence in colorectal carcinoma patients with elevated serum CEA levels

Methods/Interventions: Scans of 100 patients with an age group of 28 to 86 years were analyzed. Serum CEA ranged from 2.8 to 3398 ng/ml.

Results/Outcome(s): The findings of PET CT and CT were concordant in 94 patients-94%. Among these 94 patients with concordant results; both CECT and PET/CT were normal in 18 patients, i.e, 19% of the total patient population. Discordant results the in 6 patients (6%).

Conclusions/Discussion: In our analysis, we did not find any significant incremental value of FDG PET/CT over CECT scan in the detection of recurrence in patients with elevated serum CEA levels. However, in patients with serum CEA level less than 10 ng/ml, detection of tiny liver lesions, nodes and marrow disease by CECT is still a challenge, where PET/CT could be beneficial. In patients with CEA values > 10 ng/ml; either of the two modalities could be chosen depending upon the institutional policy. This study needs to carried out with more number of patients to evaluate the efficiency of FDG PET/CT in patients with low CEA level <10 ng/ml.

ANATOMICAL VALIDITY OF THE CRANIAL FIRST APPROACH IN LAPAROSCOPIC TRANSVERSE COLON CANCER SURGERY.

P424

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Purpose/Background: Laparoscopic surgery for transverse colon carcinoma is difficult to standardize due to high technical difficulty relevant to anatomical variety. In order to perform safe and radical surgery, central vascular ligation (CVL) and complete mesocolic excision (CME) is crucial. Approaching to the central vessels from the cranial side may make this procedure precise and adequate.

Methods/Interventions: From 2010 to 2017, 18 patients with transverse colon cancer underwent laparoscopic colectomy together with lymph node dissection was included. CT colonography and 3D angiography was routinely performed to visually recognize the anatomical variety before surgery. The dissection around the surgical

trunk was performed using cranial first approach. The surgical and short-term outcomes were verified.

Results/Outcome(s): The mean operative time and intraoperative blood loss were 192 minutes and 20mL, respectively. The mean number of harvested LNs was 19. There were no major intraoperative complications or conversions to open surgery. The median length of stay was 8 days.

Conclusions/Discussion: Cranial first approach is feasible and appropriate for radical LN dissection around the central vessels in laparoscopic transverse colon cancer surgery.

A COMPARISON OF RATES OF INCISIONAL HERNIA AND ADHESIONAL INTESTINAL OBSTRUCTION AFTER LAPAROSCOPIC AND OPEN COLORECTAL CANCER SURGERY: A COHORT STUDY.

P425

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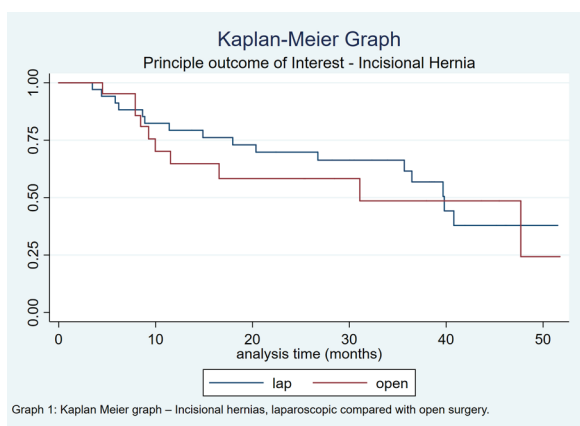
Purpose/Background: Laparoscopic surgery is non-inferior to open surgery for oncological outcomes in colon cancer and is often favoured for its better short-term outcomes (decreased length of stay, decreased use of postoperative analgesia, quicker return of bowel function and improved quality of life). Incisional hernias (IH) and adhesional intestinal obstruction (AIO) are serious long-term non-oncological consequences of colorectal surgery. Randomised control trials indicate that laparoscopic surgery may decrease the incidence of these long-term complications. However, these studies have been post hoc analyses where IH and AIO have not been studied as primary outcomes or investigated as rates. This study compares the rates of IH and AIO between laparoscopic and open surgery from a validated prospectively collated database.

Methods/Interventions: All patients undergoing laparoscopic or open surgery for colorectal cancer from the 1st of January 2014 to the 31st of December 2014 at a tertiary colorectal center were included in this study. An incisional hernia was defined as any hernia through an operative incisional wound. Parastomal hernias were not included. Detailed examination of case notes and two surgeon review of postoperative radiology was used to identify IH. Adhesional small bowel obstruction was defined as small bowel obstruction occurring greater than 30 days post the index operation. Evidence for adhesional bowel obstruction was based on characteristic symptoms, radiological confirmation, appropriate treatment patterns in non-operative cases and operation report (if applicable) without evidence of other causes of small bowel obstruction. The rates of these outcomes were recorded.

Patient demographics, co-morbidities and operative details were also recorded. Univariable and multivariable Cox Regression analysis was performed.

Results/Outcome(s): Of the 64 patients, 10 of the 26 patients in the open group and 16 of the 38 patients in the laparoscopic group developed incisional hernias (38% and 42% respectively). The median follow-up time in the laparoscopic group was 27 months (IQR 9 – 39 months) and in the open group, 11 months (8 – 28 months). The hazard ratio for IH comparing laparoscopic and open surgery was 0.85 (95% Confidence Interval (C.I.) = 0.38 – 1.89; P-value = 0.692) favouring the laparoscopic cohort. Adjusting for potential confounding variables in the multivariable regression, this effect was lessened with a hazard ratio of 0.98 (95% C.I. = 0.39 – 2.50; P-value = 0.970). All hernias were midline or umbilical apart from one upper abdominal port-site hernia. Three patients developed AIO [(open 2 (8%), laparoscopic 1 (3%)]. The median follow-up time for the laparoscopic group was 36 months (IQR 20 – 44 months) and for the open group was 19 months (IQR 8 - 34 months). Similar to the IH analysis, a Cox Regression analysis was planned for AIO. However, based on the small number of events, no further statistical analysis was justified.

Conclusions/Discussion: The rate of incisional hernia did not differ between laparoscopic and open cases, with almost 40% in each group developing incisional hernia. This study also revealed that the majority of hernias were small, midline and asymptomatic. Adhesional bowel obstruction was demonstrated to be an uncommon complication of either technique. This study is limited by its small sample size and lack of randomisation. However, we have used detailed methodology for identifying outcomes of interest, have adjusted for potential confounding variables and reported our results using rate rather than just incidence. This cohort study represents real-world outcomes of a typical public-sector tertiary referral colorectal unit in Australia and demonstrated no difference in the hazard of incisional hernia in patients having laparoscopic surgery when compared with those having open surgery.



SURGEONS' AND PATHOLOGISTS' COMFORT LEVEL WITH TOTAL MESORECTAL EXCISION (TME) GRADING FOR RECTAL CANCER.

P426

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Purpose/Background: The quality of a TME specimen is an independent predictor of recurrence rates and overall survival for rectal cancer. The pathologist's grade of the TME specimen provides important prognostic information for oncologists and patients, as well as feedback to surgeons regarding technical performance. Clinical practice guidelines recommend TME grading as a routine part of the complete pathological analysis of any rectal cancer specimen; however, uptake of TME grading has been shown to be poor. The goal of this study was to determine providers' comfort level with TME grading before and after an educational intervention.

Methods/Interventions: Surgeons and pathologists from six hospitals in Michigan were invited to participate in an instructional webinar. Before the webinar, participants self-rated their comfort with TME grading on a Likert scale from 1 (Not Comfortable) to 5 (Extremely Comfortable). The webinar lasted 1.5 hours and discussed the rationale for TME grading and grading criteria; participants also graded photographs of TME specimens in real time, with discussion led by an expert pathologist. Participants then answered a survey rating their comfort with TME grade assignment and the relevance of the webinar to their practice. Participant comfort was compared pre- and post-intervention using Student's t-tests.

Results/Outcome(s): Nine surgeons and eight pathologists from six hospitals participated in the intervention. Prior to the intervention, rectal cancer surgeons reported a mean comfort level of 3.7 ± 0.82 with TME grade assignment, while pathologists reported an average comfort of 2.0 ± 0.87 . Four surgeons (44%) and four pathologists (50%) reported they had never been taught to grade TME specimens. Five pathologists had graded fewer than five specimens, one had graded 5-10, one had graded 10-20, and two graded over 20 specimens. The baseline mean reported comfort level with TME grading for the complete cohort was 2.9 ± 1.2 before the webinar. After the intervention, participants reported a mean comfort of 3.7 ± 0.9 ($p=0.040$). Surgeons reported a mean comfort of 4.4 ± 0.53 ($p=0.058$), and pathologists 3.1 ± 0.78 ($p=0.011$). 100% of participants reported that the content of the webinar was relevant to their practice and that they intended to use the information in their practice.

Conclusions/Discussion: This study shows that neither surgeons nor pathologists are extremely comfortable with TME grading for rectal cancer. Furthermore, a low-cost webinar can significantly increase comfort with this technique. This intervention can be disseminated to increase

TME grading, which will provide valuable prognostic information and promote technical and oncologic improvement in rectal cancer surgery.

REVISITING PAGET'S DISEASE OF THE ANUS: LITERATURE REVIEW AND ANALYSIS OF PUBLISHED CASES IN THE LITERATURE.

P427

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Purpose/Background: Extramammary Paget's Disease (EMPD) is a rare clinical entity. The most common sites of disease are in the perineal region, with 20% of these EMPD cases located in the anus and perianal region. Due to the rarity of perianal Paget's disease (PPD), it is often misdiagnosed, and can be difficult to study. There are no clear guidelines for treatment. There are about 200 cases described in the literature. Our aim was to better characterize this pathology and propose a treatment algorithm.

Methods/Interventions: A search was conducted on PubMed for case reports and case series on PPD. We focused on cases and reports where clinical data were available. Data on epidemiology, prior medical history, treatment patterns, pathology, and outcomes were extracted. Complete data was not available for all case reports. The data were analyzed using Microsoft Excel for patterns and better characterization of the cohort. Reports that focused on the pathologic aspects of the disease and did not describe clinical course, were excluded.

Results/Outcome(s): Data was collected on 65 cases of PPD from 33 papers. Average age of included patients was 68 years old (n=55; 29-90). Median age was 68.5 years old. Sex was noted in 56 patients; our cohort included 39 males and 17 females. Presenting complaints were available in 34 patients. Pruritis was the most common chief complaint, seen in 10 patients, and bleeding was noted in 9 patients. Perianal pain was also common. Median time to diagnosis was 1 year, although inconsistently noted. 48 of 65 (73.8%) patients analyzed had associated malignancy, while 16 did not. One diagnosis was unclear. Adenocarcinoma was the most common underlying malignancy, seen in 38 (58%) of the cases we analyzed. A variety of other malignancies were also seen, with patients having associated cloag-enic carcinoma, squamous cell carcinoma, carcinoid, and others. Of the 48 patients who had underlying malignancy, the location was noted in 44. The most common location was rectal, with 20 cases, and then anus with 6. Twelve patients had anorectal disease, and four had malignancy in the perianal region. Overall, 28 patients underwent colostomies in the course of their treatment. Of these, 21 patients underwent abdominoperineal resections as part of treatment. Ten patients received radiation as part of treatment, and 7 received local creams. Unfortunately, outcomes and follow up were inconsistently described.

At time of last follow up, 31 patients were alive, 16 were deceased, and 18 had unclear follow up data. Mean follow up time was 3.8 years, median was 2 years.

Conclusions/Discussion: PPD is a rare condition, and is often diagnosed incidentally. Our data shows how PPD is often associated with malignancy, and this should be ruled out in cases of suspected PPD. PPD is also multiply recurrent, and patients and providers should be aware of this characteristic of the disease. Lu et al (2013) also asserted the depth of invasion is an important prognostic factor. The roles of chemotherapy and radiation are undefined in PPD, but may be helpful. Contrary to other reports, (Shepherd, 2005), our cohort had a predominance towards males. This study improved our knowledge of PPD, including its presentation, disease course, and patterns of treatment. Further research should better characterize this rare pathology and associated outcomes. Hopefully, collecting outcomes data across institutions on this rare disease can help lead to better guidelines for treatment.

CHANGE IN ANORECTAL FUNCTION AFTER STANDARD RECTAL CANCER TREATMENT.

P428

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Purpose/Background: Multidisciplinary treatment with concurrent chemoradiotherapy followed by total mesorectal excision has been robustly accepted to manage locally advanced rectal cancer patients. Sphincter-saving surgery is now a common procedure, and many patients and colorectal surgeons believe that preservation of sphincter is important in the quality of life. However, anorectal dysfunction after sphincter-saving surgery in rectal cancer patients results in poor quality of life. In the present study, change in anorectal function after rectal cancer treatment was investigated using anorectal manometry.

Methods/Interventions: A retrospective review was performed on patients with locally advanced rectal cancer who underwent radical rectal resection from January 2012 to December 2016. Patients who received non-sphincter saving surgery, transanal local excision, palliative bypass surgery, subtotal or total colectomy were excluded. Patients with the distal margin of tumor located above 12cm from the anal verge as well as patients who received postoperative concurrent chemoradiotherapy (CCRT) were also excluded. To compare the effect of CCRT and subsequent total mesorectal excision (TME) on the anorectal function serially, a one-way repeated ANOVA was conducted using the anorectal manometry values measured before and after the CCRT and at 6 -to 12-month period postoperatively. Paired sample T-tests were conducted to make post hoc comparisons between CCRT and TME.

Results/Outcome(s): After preoperative CCRT, the resting pressure as well as squeezing pressure did not show

a significant change, p -value = 0.618 and 0.257 respectively. Rectal compliance was significantly reduced after preoperative CCRT, p -value = 0.021. The resting and squeezing pressure showed a significant reduction after TME, p -value = 0.031 and <0.005 respectively. Rectal compliance demonstrated significant drop after TME, p value <0.005 .

Conclusions/Discussion: Demonstrated by minimal change in the resting and squeezing pressure, the function of internal and external sphincter after CCRT is minimally changed. However, preoperative CCRT results in significant reduction in rectal compliance. Radical rectal resection results in significant loss of anorectal function by functional loss of internal and external sphincter as well as rectal compliance, reflected in steep decline in the anorectal manometry in postoperative period.

ROBOTIC LATERAL LYMPH NODE DISSECTION STRATEGY FOR RECTAL CANCER.

P429

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Purpose/Background: Robots have been widely recognized and applied in radical resection of rectal cancer with their own advantages. However, controversy remains around whether the addition of robotic lateral lymph node dissection (LLND) to total mesorectal excision offers benefits to patients with mid-low rectal cancer. The purpose of this study was to explore the selection of LLND indications of robotic surgery for mid-low rectal cancer.

Methods/Interventions: A total of 5 cases of LLND operation for mid-low rectal cancer performed via Da Vinci robot, all of which were males. In 5 cases above, 3 cases treated with neoadjuvant chemotherapy (FOLFOX6) and 2 cases without neoadjuvant chemotherapy. Of the 5 cases, 2 cases recurred or metastasized within 6 months after operation.

Results/Outcome(s): No urination disorder or sexual dysfunction were found in the whole 5 cases of robotic radical operation with LLND of mid-low rectal cancer patients. Among them, the primary tumor size of 2 cases with rectal cancer were both larger than 5cm before neoadjuvant chemotherapy and the staging was both cT3N2M0. The effectiveness evaluation of neoadjuvant chemotherapy was both TRG2 and TRG0 respectively. The postoperative staging was pT3N2M0 and pT1N1M0. The tumor cell differentiation was low differentiated, mid-low differentiated and part of mucinous adenocarcinoma. The postoperative pathological examination showed that the lateral lymph node metastasis was 4/4 and 2/5 respectively. In the 2 cases, one case had liver metastasis 1 month after surgery, lung metastasis 3 months after surgery, and the other case had recurrence of bilateral iliac vessels 4 months after surgery. In the other 3 cases, the primary tumor size

of pre-/post- neoadjuvant chemotherapy was smaller than 5cm. The preoperative staging was cT2N1M0, cT4aN1M0 and cT4aN1M0(TRG4), and the postoperative staging was pT1bN0M0, pT3N1M0 and pT4aN2M0. These 3 cases were all moderately differentiated adenocarcinoma with lateral lymph nodes <0.5 cm. No metastasis was found in the lateral lymph nodes after postoperative pathological detection, and no recurrence or metastasis was found within 6 months after surgery.

Conclusions/Discussion: The lateral lymph node metastasis of mid-low rectal cancer may be closely related to tumor size, tumor cell differentiation degree, lateral lymph node size, and peri-intestinal lymph node metastasis. Robotic LLND is beneficial to the protection of pelvic autonomic nerves. LLND is selected according to the lateral lymph node size before and after neoadjuvant chemotherapy (either larger than 0.5cm is recommended; smaller than 0.5cm is deprecated). After robotic LLND, it still faces a high risk of recurrence and metastasis for mid-low rectal cancer patients with radical resection.

COLON CANCER IN THE YOUNG; CONTRIBUTING FACTORS AND SHORT-TERM SURGICAL OUTCOMES.

P430

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Purpose/Background: Colon cancer (CC) is the third most common cancer in the United States and the third most common cause of cancer related deaths. The overall incidence of CC has decreased in the last several decades. However, the incidence in young patients has increased significantly over the same time period. The aim of this study is to evaluate patient factors that are contributing to this epidemiological change and analyze the short-term surgical outcomes of patients undergoing surgery.

Methods/Interventions: We performed a 2-year review (2015-2016) of the ACS-NSQIP database and included all patients with CC who underwent surgical management. Patients were stratified into two groups on the basis of age at presentation: Early-onset CC (<50 years old) and late-onset CC (≥ 50 years old). Outcome measures were hospital length of stay, 30-days complications, mortality, and readmission. Multivariable logistic regression analysis was performed.

Results/Outcome(s): We included a total of 15,957 patients in the analysis. Mean age was 65 ± 13 years, 52% were male. Overall 10% of the patients had early-onset CC. Patients with early-onset CC were more likely to be black (11% vs 7%, $p=0.04$), and Hispanic (8% vs 4%, $p=0.02$). Additionally, they presented with a more aggressive tumor and higher TNM staging. The patients were also more

likely to undergo emergent surgery (20% vs 16%, $p=0.01$) compared to patients with late-onset CC. On analysis of outcomes, patients with early-onset CC had lower 30-d complications (18% vs 22%, $p=0.02$), shorter hospital length of stay (6[3-8], vs 8[5-11], $p=0.03$) and lower 30-d mortality (0.4% vs 1.8%, $p=0.04$) compared to their counterparts. However, there was no difference between the two groups regarding 30-d readmission ($p=0.29$). On multivariate regression analysis after controlling for demographics, comorbidities, type and approach of surgery, TNM stage and ASA class, there was no difference between the two groups regarding the outcomes (Table 1).

Conclusions/Discussion: Racial disparity does exist in the incidence of colon cancer in the young with higher incidence in blacks. Young patients also tend to have more aggressive disease and are likely to undergo emergency surgery. However, younger patients with CC tend to have better surgical outcomes on univariate regression analysis. When comorbidities are factored in the analysis, the surgical outcomes between the two groups are comparable.

EARLY REMOVAL OF THE URINARY CATHETER AFTER COLORECTAL CANCER SURGERY DOES NOT INCREASE THE INCIDENCE OF ACUTE URINARY RETENTION.

P431

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Purpose/Background: Background Acute urinary retention is a common postoperative complication for patients undergoing colorectal cancer surgery. Although several studies have attempted to solve the problem, the best timing for urinary catheter removal and the risk factors for acute urinary retention after colorectal cancer surgery are still unclear.

Methods/Interventions: Methods This prospective study collected data from included patients undergoing colorectal cancer surgery at a single center. Between July 2017 and March 2018, 161 patients were enrolled. According to

urinary catheter duration, 45 patients undergoing colon cancer surgery were divided into 1 day group and 3 days group preoperatively. In addition, 116 patients undergoing rectal cancer surgery were divided into 3 days group, 5 days group and 7 days group. Preoperative urinary function was evaluated using the International Prostate Symptom Score (IPSS). Clinical data were collected and analyzed to identify the suitable timing of urinary catheter removal and assess the risk factors for acute urinary retention.

Results/Outcome(s): Results The incidence of acute urinary retention is 11.8% overall. There is no statistical difference in 2 groups (1, 3 days) receiving colon cancer surgery and 3 groups (3, 5, 7 days) receiving rectal cancer surgery respectively. In a logistic regression analysis, operation time (OR 4.175, $P = 0.009$) was an independent risk factor for acute urinary retention after colorectal cancer surgery.

Conclusions/Discussion: Conclusions This study suggests that early removal of the urinary catheter after colorectal cancer surgery does not increase the incidence of acute urinary retention. Operation time restriction may prevent acute urinary retention after colorectal cancer surgery.

DOES AGE MATTER IN TREATMENT SELECTION AND PROGNOSIS OF METASTATIC COLORECTAL CANCER: ANALYSIS OF THE NATIONAL CANCER DATA BASE.

P432

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Purpose/Background: Approximately 20% of newly diagnosed colorectal cancer present with distant metastases. Although multimodality therapy has been widely used to treat patients with metastatic colorectal cancer (mCRC), the five-year relative survival remains substantially low. Age has been associated with the effectiveness of the treatment. The purpose of this study is to examine how treatment strategies have varied by age since 2004

P430 Table 1. Tumor characteristics and Regression analysis

Tumor Characteristics	Early-onset CC (n=1,567)	Late-onset CC (n=14,390)	p-value
Size of tumor, T>2, %	64%	58%	0.02
Lymph node involvement, %	49%	38%	0.02
Distant Metastasis, %	12%	7%	0.01
Multivariate Regression Analysis* (Early vs Late onset CC)	Odds Ratio	95% Confidence Interval	p-value
30-d Complications	0.97	0.79 - 2.45	0.26
30-d Mortality	0.92	0.82 - 3.15	0.28
30-d Readmissions	1.11	0.92 - 3.58	0.59

* Controlled for demographics, comorbidities, TNM Stage, ASA class, type and approach of surgery

and whether age plays a role in effect of treatment among patients with mCRC.

Methods/Interventions: A total of 43,977 patients with mCRC were identified from the National Cancer Data Base (NCDB) 2004-2014. Patients were classified into three age groups: 18-49, 50-75, and age >75 years old). Percentages of each treatment category including primary tumor resection (PTR) only, chemotherapy only, and PTR plus chemotherapy were described. After adjusting for demographic and clinical factors, restricted mean survival time (RMST) was calculated and compared between different age and treatment groups.

Results/Outcome(s): The majority (61.8%) of patients in the 18-49 age group received PTR plus chemotherapy, approximately half (53.3%) of the patients in the 50-75 age group and approximately one third (34.7%) in the >75 age group received PTR plus chemotherapy. There was a decreasing trend in PTR plus chemotherapy and an increasing trend in chemotherapy only for mCRC patients over the study time period ($P_{\text{trend}} < 0.05$) in all age groups. PTR plus chemotherapy demonstrated the most favorable survival in all age groups compared to other treatments. Chemotherapy only was associated with significantly higher survival time compared to PTR except for patients in the 18-49 group. Among patients who had PTR plus chemotherapy treatment, peri-operative chemotherapy was associated with the longest survival in patients in the age 18-49 and 50-75 groups, but not in the >75 group, compared to other treatments.

Conclusions/Discussion: A decreasing trend of PTR plus chemotherapy was observed among mCRC patients between 2004-2014, though it showed the most survival benefit in all age groups. Benefits of specific multimodality treatment varies by age groups.

THERAPY OPTIONS FOR T4 LESION RECTAL CANCER PATIENTS POST-PROSTATIC IRRADIATION: A CASE SERIES.

P433

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Purpose/Background: The risk for the development of rectal cancer and other pelvic malignancies are significantly increased in patients who have received radiation for prostate cancer. In these rectal cancer patients, treatment options are limited as a result of their prior radiation.

Methods/Interventions: A case series of three patients with T4 lesion rectal cancer are presented, along with their pathology, treatment plan, and varied post-treatment course.

Results/Outcome(s): Of the three patients, two are currently with no evidence of disease, with the other having metastasized to multiple other areas of the body, including lungs and spine. In our very limited sample,

it seems that as the intensity of non-surgical treatment increases, the patient's overall health deteriorates and outcomes are not improved.

Conclusions/Discussion: As such, the best treatment protocol for T4 rectal cancer patients post prostatic radiation may be early extirpative surgery for node negative patients, and possibly no surgery at all for node positive patients.

SCREENING STAU INDEPENDENTLY PREDICTS MORTALITY IN COLORECTAL CANCER: A 10 YEAR SINGLE CENTRE PROSPECTIVE COHORT STUDY.

P434

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Purpose/Background: The United Kingdom national bowel screening programme was introduced with the intention of detecting early stage lesions in attempt to improve patient survival. Screen detected (SD) colorectal cancer (CRC) has been reported to have a better survival than patients referred with symptoms outwith the screening programme (NSD). This may be as a result of cancers being identified in a younger, healthier population and at an earlier pathological stage. However, the exact reasons are unclear. Some authors suggest there may be inherent biological differences in SD CRC. We aim to compare patient and tumour characteristics detected through bowel screening (SD) with those detected out with the programme (NSD). In addition we seek to determine if screen detection is an independent predictor of outcome when controlling for key pathological and patient factors known to influence prognosis.

Methods/Interventions: This was a cohort study of all CRC diagnosed in NHS Grampian in Scotland, United Kingdom. In Scotland, individuals aged 50-74 are invited biannually to participate in bowel screening by completing a faecal occult blood test. A positive test generates invitation for colonoscopy. We included patients 51 – 75 years old presenting with potentially resectable SD or NSD CRC between June 2007 – July 2017 at Aberdeen Royal Infirmary. Patients outside this age range were excluded. Data were obtained from a prospectively maintained regional pathology database and outcomes were obtained from Information Services Division, Scotland records. All-cause mortality at 1- and 5-years were examined. Cox's proportional hazards regression model was used to estimate the effect of screening status, age, gender, duke stage, tumour location, extramural venous invasion (EMVI) status and lymph node ratio (LNR) on overall survival.

Results/Outcome(s): Of 1618 patients included, 1019 (63%) were male. 449 (28%) had SD and 1169 (72%) non NSD tumours. Presenting stage was more advanced in NSD (T4 in 25%) compared to SD tumours 10%

($p < 0.001$). Nodal disease was also more common in NSD cancers ($p < 0.001$). Negative prognostic indicators including extra mural vascular invasion (EMVI) and higher lymph node ratio (LNR) were observed more frequently in NSD cancers ($p < 0.001$). SD tumours were associated with a more favourable survival at 1 (96%) and 5 years (80%) compared to NSD cancers (90 & 62%) respectively ($p < 0.001$). SD tumours conferred a survival advantage over NSD if they were located in either the right or left colon ($p < 0.001$). Death within 90 days was also more common in NSD 37 (3%) compared to patients with SD 5 (1%) lesions. Among these early deaths there were no differences between groups in relation to patient age, co-morbidities or emergency presentation. However in comparison to those not dying within 90 days, this group as a whole were significantly more co-morbid ($p < 0.001$). On a cox proportional hazards model for mortality comparing screening status while controlling for all other variables, SD cancer was found to be an independent predictor of survival (HR 0.59; CI 0.47, 0.75 $p < 0.001$). Advanced age, EMVI and increased LNR were also associated with curtailed survival.

Conclusions/Discussion: In this 10 year study, the largest of its kind, we have shown that screening status is an independent predictor of survival irrespective of host and tumour characteristics. The reasons for this are unclear but may support theories that SD cancers are biologically distinct from their symptomatic counterparts. Further studies are required to clarify this. We have also established the importance of EMVI and higher LNR as negative prognostic indicators in CRC.

TRANSANAL TOTAL MESORECTAL EXCISION (TATME): ARE WE DOING IT FOR THE RIGHT INDICATION? AN ASSESSMENT OF ONLINE VIDEO RESOURCES.

P435

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Purpose/Background: TATME is a novel technique that is gaining traction for the treatment of low rectal cancer. TATME could overcome the technical difficulties in accessing the narrow low pelvis with conventional laparoscopy. In view of the increasing interest for this innovative surgical approach, courses and training programs have been developed, with many video demonstrations being uploaded on the Internet. Aim of this study was to systematically assess the availability and quality of online TATME videos.

Methods/Interventions: After establishment of the study protocol, 2 authors independently performed a broad search for all TATME videos on Youtube.com, Colorectal diseases journal page, Websurg.com and AIS channel.

The websites were systematically searched with the terms "TATME", "transanal total mesorectal excision", "transanal TME" and "transanal surgery". The last search was run on 16th August 2018. Collected data included: video characteristics (date uploaded, total number of views, average views per month, live surgery), patient details (age, gender, body mass index, ASA score, previous surgery), indication for surgery (preoperative staging, distance from anal verge) different steps demonstrated, presence of supplementary educational content (audio commentary, use of diagrams and screenshots).

Results/Outcome(s): A total of 46 videos were included. The median number of views per month was 92 (range 2-926). Median length of the videos was 10.45 minutes (interquartile range 8.5 minutes). 10 videos (21.7%) were live cases. 19 videos (41.3%) reported the age of the participants, with a median of 64 years (range 32-81). 29 TATME were performed on male patients (63%). 20 videos (43.5 %) reported the BMI of the patient, with a median of 27 (range 23-34). The BMI indicated obesity (30 or higher) in 2 cases. The use of neoadjuvant treatment was reported only in 8 cases (17.4%), with 6 patients receiving preoperative radiotherapy. 18 videos (39.1%) reported the distance of the tumor from the anal verge, with a median of 6.4cm (1.8-14cm), and in 9 cases the tumor distance from the anal verge was 7 cm or higher. Initial staging was reported in 17 videos (37.0%), with 1 T1, 3 T2, 10 T3 and 3 T4 tumors. A majority of the videos (84.8%) had audio commentary and 32 videos (69.6%) also showed the laparoscopic part of the procedure. Mesorectal dissection was the one step shown the most in the videos, appearing in 44 videos (95.7%). Specimen extraction was the least represented step (39.1%). Final histology was given in 19 videos (41.3%).

Conclusions/Discussion: There has been more interest in the publication of TATME videos with more views per video per month than previously published for laparoscopic right hemicolectomy. Initial studies have shown a steep learning curve, and videos may provide a useful tool for the practicing surgeon. A formal training program for TATME has been validated in the US and the UK, and this modular approach to training is likely reflected in the high educational content found in TATME online videos, with many videos showing several steps of the procedure and providing additional educational content such as commentary, imaging and diagrams. A significant proportion of videos were live operating cases, which poses an interesting conundrum - with TATME being a novel method, and higher rates of operating surgeons' stress and poorer postoperative outcomes previously reported in the surgical literature. The most interesting finding of our study is the controversial indication for TATME presented in many videos. The technique has been developed to facilitate dissection in the narrow male pelvis, obese patients and low rectal tumors. 18 videos reported the height of the tumor, and in 9 cases this was 7 cm or higher. There were

only 2 out of 13 cases that had patients with a BMI of over 30, with only 63% of patients being male. These findings raise concerns over video demonstrations lacking external validity in real life scenarios, even if the different steps of the procedure may be easier to demonstrate for the operating surgeon. It would be even more concerning if the TATME technique was being performed for non-standard indications, but this conclusion cannot be made on the basis of our preliminary findings, and can be addressed by the TATME registry and publications of large prospective studies.

ANASTOMOSTIC LEAKAGE AFTER ANTERIOR RESECTION FOR RECTAL CANCER: A SINGLE CENTER REVIEW.

P436

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Purpose/Background: Anastomotic leakage (AL) after anterior resection (AR) for rectal cancer is a serious and common post-operative complication. AL is a major source of post-operative morbidity and mortality. Several clinical and surgical factors may predispose patients to AL. Among those factors, the association between anastomotic technique and AL rate remains unclear. We decided to evaluate the influence of anastomotic techniques on AL rate in the last decade in our center.

Methods/Interventions: We conducted a retrospective cohort study on all patients who underwent AR for rectal cancer between January 2003 and December 2014 in our center. The type of anastomosis and usual demographic data were collected. The main outcome was the incidence of radiologic or clinical AL within 30 days postoperatively.

Results/Outcome(s): Of the 449 patients included in our study, mean age was 62.7 years, 70% were males, mean BMI was 27.6 kg/m², and mean Charlson Comorbidity Index (CCI) was 2.6. Preoperative cancer stage was T1 in 8%, T2 in 30%, T3 in 59%, T4 in 2% and N+ in 41% of tumours. Tumour distance from anal verge was 0 to 6 cm in 48%, 6 to 10 cm in 37% and 10 to 15 cm in 15%. Fifty-seven percent of patients had neoadjuvant chemoradiation. Sixteen percent of them had open surgery, 84% had laparoscopic surgery and 6% had conversion. Sixty-seven percent of patients had stapled anastomosis, 14% had handsewn anastomosis and 18% had delayed coloanal anastomosis (Turnbull-Cutait). Diverting ileostomy was performed in 63% of patients. AL occurred in 51 (11.4%) patients. Regarding anastomotic techniques, AL rate was 11.5% in stapled anastomoses, 10.9% in handsewn anastomoses and 11.0% in delayed coloanal anastomoses. AL rates were compared with Chi-squared tests. There was no statistically significant difference between the 3 groups (all p>0.05). Age, gender, neoadjuvant chemoradiation

and surgical approach (open or laparoscopic) had no influence on AL rate (all p>0.05). BMI \geq 30 (RR 1.8, p=0.02), CCI \geq 3 (RR 2.2, p=0.003), cigarette smoking (RR 2.1, p=0.008), tumour at \leq 10 cm from anal verge (RR 1.1, p=0.02) and absence of diverting ileostomy (RR 1.4, p<0.001) were all factors associated with an increased risk of AL. Of the 51 patients with AL, 14% had expectant management, 6% had radiologic drainage, 35% had transanal drainage and 45% had abdominal re-exploration. Of all patients with AL, 59% had an ileostomy created at their initial surgery, while 24% had one created at the diagnosis of AL. Restoration of bowel continuity was possible in 71% of patients with AL and in 94% of patients without AL.

Conclusions/Discussion: The rate of radiologic and clinical AL within 30 days postoperatively remains high. In our cohort of patients, anastomotic technique had no influence on AL rate. BMI, cigarette smoking, tumour distance to anal verge and utilisation of diverting stoma influenced AL incidence. A majority of patients could be managed without abdominal surgery. Restoration of bowel continuity was still possible in 71% of patients with AL.

DELAYED COLOANAL ANASTOMOSIS OF TURNBULL-CUTAIT DOES NOT REDUCE ANASTOMOTIC LEAKAGE AFTER LOW ANTERIOR RESECTION FOR RECTAL CANCER BUT MAY REDUCE ITS CLINICAL IMPACT.

P437

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Purpose/Background: Surgical treatment of low rectal cancer is challenging. Turnbull-Cutait delayed coloanal anastomosis (DCA) represents a treatment option for those patients. Anastomotic leakage (AL) after low anterior resection (LAR) for rectal cancer remains a serious and common post-operative complication. The DCA was introduced for the treatment of primary rectal cancer in 2010 in our center with the objective to reduce the rate of AL and omit the utilisation of diverting ileostomy. We decided to evaluate the influence of DCA on AL rate in our center.

Methods/Interventions: We conducted a retrospective cohort study on all patients who underwent LAR for rectal cancer between January 2010 and December 2014 in our center. We analyzed the influence of DCA on radiologic and clinical AL within 30 days after surgery.

Results/Outcome(s): We identified 337 patients during the study period, with 82 (24%) of them having DCA performed. Sociodemographic and clinical characteristics between patients with DCA and patients with other anastomotic techniques were compared. Mean age (62.7 years) and mean Charlson Comorbidity Index (CCI of 2.7) were similar. DCA group had a higher proportion of males

(88 vs 63%) and higher mean BMI (28.8 vs 27.3 kg/m²). Preoperative cancer stages were similar, being T1 in 8%, T2 in 31%, T3 in 58%, T4 in 2% and N+ in 37% of tumours. DCA group had a higher rate of low rectal cancer (85 vs 36%). Proportion of neoadjuvant chemoradiation was higher in DCA patients (71 vs 56%). All patients had similar surgical approach (7% had open surgery, 93% had laparoscopic surgery and 5% had conversion). Diverting ileostomy rate was significantly lower in patients who had DCA (11 vs 78%; $p < 0.001$). AL occurred in 9 (11.0%) patients with DCA and in 27 (10.6%) patients with other anastomotic techniques. Fisher exact test showed no statistically significant difference between AL rates ($p > 0.05$). Age, gender, BMI, CCI, cigarette smoking, surgical approach (open or laparoscopic) tumour distance to anal verge and diverting ileostomy had no significant influence on AL rate within patients with DCA (all $p > 0.05$). Patients with AL had similar rates of expectant management (11 vs 16%). Radiologic and transanal drainage rates were higher in DCA group (respectively 22 vs 4%, and 44 vs 36%). Abdominal exploration was required in 22% of patients with DCA and in 44% of patients without DCA (RR 1.4; 95%IC: 0.9-2.3). In patients with AL, diverting ileostomy was created at the initial surgery or at diagnosis of AL in 67% of patients with DCA, and in 88% of patients without DCA (RR 2.8; 95%IC: 0.7-11.3). Overall restoration of bowel continuity was possible in 75% of patients with AL. DCA was associated with a better chance of bowel continuity restoration (83 vs 73%; RR 1.07; 95%IC: 0.7-1.6).

Conclusions/Discussion: Delayed coloanal anastomosis of Turnbull-Cutait does not reduce the rate of radiologic or clinical AL within 30 days after surgery. However, stoma creation rate at initial surgery was significantly lower in patients who had DCA. In a high proportion of DCA patients, AL were managed without abdominal exploration and bowel continuity was restored. Our study suggests that DCA reduces reoperation and diverting ileostomy rates after AL. This anastomotic technique can be useful in selected cases.

GOBLET CELL CARCINOMA OF THE APPENDIX: 4 CASE REPORTS PRESENTED WITH A LITERATURE REVIEW.

P438

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Purpose/Background: Cancer of the appendix is rare, with the incidence being 0.12 cases per 1 million people per year. Goblet cell carcinoma (GCC) is one type of appendiceal neoplasm that exhibits both glandular and neuroendocrine components. GCC most commonly presents as an acute appendicitis; however, it is diagnosed in less than 1% of appendectomies, most often incidentally after the specimen is sent to pathology. Patients may

also present with abdominal pain and a mass in already advanced stages of the disease. Due to the rarity of this cancer, evidence-based research is limited.

Methods/Interventions: In this article, we present 4 case reports from our institution and then do an extensive literature review to assess the current standards for GCC staging, treatment, prognosis and follow up.

Results/Outcome(s): Three of the case reports presented as typical acute appendicitis. They were definitively treated with right hemicolectomies with no need for further intervention. The fourth case presented as a small bowel obstruction, which had already metastasized to the omentum and carried a poor prognosis. Even with chemotherapy, the patient expired 14 months after diagnosis. Our literature review showed a lack of standardized staging and treatment for GCC.

Conclusions/Discussion: The risk of missing the diagnosis and the aggressiveness of GCC demonstrates the importance of early diagnosis and treatment. This can be an argument against treating acute appendicitis nonoperatively with antibiotics instead of surgery. Based on the current literature, we concluded that standardization and larger research studies are needed to improve treatment and overall survival for GCC of the appendix.

IS SIMULTANEOUS LAPAROSCOPIC MULTI-ORGAN RESECTION POSSIBLE IN COLORECTAL SURGERY?

P439

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Purpose/Background: Laparoscopic approach is nowadays the treatment of choice in elective colorectal surgery since it provides faster recovery with less postoperative morbidity. In certain occasions, it is necessary to associate a second organ resection. Whether simultaneous multi-organ resection contraindicates the mini-invasive approach or modifies postoperative evolution is still a matter of debate. The aim of this study is To analyze feasibility and safety of laparoscopic colorectal surgery combined with another abdominal organ resection.

Methods/Interventions: Patients operated due to colorectal disease from 2000 to 2018 were identified. Elective laparoscopic resections of the colon and rectum were included. The sample was divided into two groups: surgeries associated with another abdominal organ resection (G1) and those not associated with second resection (G2). We analyzed demographic factors, intraoperative variables and postoperative morbidity and mortality using Dindo-Clavien score.

Results/Outcome(s): A total of 1585 surgeries met the inclusion criteria. Eighty-eight patients belonged to G1 and 1497 to G2. Mean age was 60 years old ($p = NS$)

with a higher proportion of males in G2 (G1: 39 (44%), G2: 827 (55%), $p < 0.05$). No differences were found when comparing smoking, body mass index, previous abdominal surgery or ASA score. Surgical colorectal procedures were: 824 (52%) left colectomies, 382 (24%) right colectomies, 57 (3.5%) segmental colectomies, 144 (9%) total colectomies, 156 (10%) low anterior resections and proctectomy and 22 (1.5%) abdominoperineal resections ($p = \text{NS}$). The most frequently associated organ resected were: 26 (29.5%) hepatectomies, 18 (20%) cholecystectomies, 14 (16%) enterectomies and 11 (12.5%) adnexectomies. Intraoperative complications (G1: 15 (17%), G2: 108 (7%), $p < 0.05$), conversion rate (G1: 25 (28%), G2: 105 (7%), $p < 0.05$) and the use of postoperative intensive care unit (G1: 28 (31%), G2: 176 (12%), $p < 0.05$) were more frequent in G1. Operative time and length of hospital stay were also significantly higher in G1 (G1: 227 min, G2: 173 min, $p < 0.05$ and G1: 7.1 days, G2: 4.7 days, $p < 0.05$). No differences were found in reoperation rate, rehospitalization, morbidity and mortality at 30 days.

Conclusions/Discussion: Laparoscopic colorectal surgery associated with another abdominal organ resection is feasible and safe. In spite of being more complex procedures, they do not increase postoperative morbidity and mortality.

NOT ALL PRESACRAL TUMORS ARE CREATED EQUAL: NEED FOR OPERATIVE INTERVENTION SHOULD BE BASED ON PATIENT-SPECIFIC FACTORS.

P440

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Purpose/Background: Presacral tumors are rare and often found incidentally, with a diverse differential in terms of pathology. Current ASCRS guidelines recommend an aggressive surgical approach for all presacral tumors, when technically feasible, due to the risk of malignancy, malignant transformation or infection. MRI is the current recommended imaging modality to characterize these lesions preoperatively. The aim of this study is to assess the symptomatology and characteristics of these lesions as they relate to final surgical pathology after presacral mass excision.

Methods/Interventions: This was a retrospective review of all patients who underwent excision of a presacral mass over a 15 year period. Preoperative data included imaging modality (CT, MRI or both), biopsy results when performed, and presence/absence of symptoms. Preoperative imaging was further characterized with respect to specific features (cystic, solid or combined) of the mass. These preoperative characteristics were then correlated with final surgical pathology results.

Results/Outcome(s): Twenty-six patients underwent surgical excision of their presacral tumor at our institution during this time period. The mean age of this patient population was 45. The majority of patients were female (65%). Preoperative imaging included MRI for 24 (92%) of the patients and CT alone for 2 (8%). Imaging review found 13 (50%) cystic, 7 (27%) solid and 6 (23%) combined tumors. Of the 13 cystic tumors, 0 were biopsied and 100% were found to have benign pathology. Cystic pathologies included 8 cystic hamartoma (62%), 2 epidermoid cyst (15%), 2 cystic teratoma (15%), and 1 simple cyst (8%). 62% of the patients with cystic tumors were symptomatic at the time of surgery. Of the solid tumors, 3 (43%) were malignant with pathologies including liposarcoma, chordoma, and undifferentiated pleomorphic sarcoma. All tumors with combined solid and cystic components were benign on final pathology.

Conclusions/Discussion: Preoperative MRI findings consistent with a solely cystic lesion demonstrated 100% positive predictive value for a benign lesion as determined by surgical pathology. Given these findings and a paucity of data on the true malignant transformation potential for cystic lesions, surgical excision may not be warranted in asymptomatic patients or when lesions are noted incidentally. Ongoing efforts are underway to assess radiographic surveillance of this patient population and define the true malignant potential for these tumors.

RISK FACTORS FOR UPSTAGING OF RECTAL CANCER: ARE WE CORRECTLY PREDICTING DISEASE STAGE?

P441

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Purpose/Background: The use of neoadjuvant chemoradiotherapy, or total neoadjuvant therapy, for stage II and III rectal cancers has dramatically improved local recurrence rates and decreased morbidity. Pretreatment staging is determined with magnetic resonance imaging (MRI) and/or ultrasound, but the extent to which these modalities inaccurately stage patients who may have been candidates for neoadjuvant therapies remains to be determined. The purpose of this study is to evaluate patient and tumor characteristics that are associated with rectal cancer upstaging on final pathology in order to improve patient selection for neoadjuvant therapies.

Methods/Interventions: We conducted a retrospective review of prospectively collected data among patients who underwent total mesorectal excision (TME) for rectal cancer between 2012 and 2018. Patients with unknown preoperative staging or preoperative staging of T4N2 were excluded, as were patients who underwent local excision. Patients were considered to have been upstaged if the

T stage and/or N stage on final pathology was higher than what had been staged preoperatively. Univariate and multivariate analyses were performed to identify patient and tumor factors associated with final pathologic upstaging.

Results/Outcome(s): Of the 358 rectal cancer patients, 51 (14.3%) were upstaged on final pathology. These included 18 patients (35.3%) with upstaged T stage alone, 23 patients (45.1%) with N stage alone, and 10 patients (19.6%) upstaged on and both T and N stage. For 25 (49.0%) of the patients upstaged on final pathology, neoadjuvant therapy would have been recommended. On univariate analysis, factors associated with pathologic upstaging included female gender, preoperative stage, preoperative staging with ultrasound alone (vs MRI), patients who did not receive neoadjuvant chemoradiotherapy, and carcinoembryonic antigen (CEA) level ($p < 0.1$). Tumors located in the anterior position of the rectum as well as tumors located in the middle third of the rectum were significantly less likely to be upstaged on final pathology. On multivariate analysis, preoperative stage I and II patients (as compared to stage III) and those with tumors not located in the middle third of the rectum (i.e. in the upper or lower third) were significantly associated with upstaging ($p < 0.05$) (Table 1). Additionally, tumors located in the anterior position of the rectum were significantly less likely to be upstaged on final pathology ($p = 0.029$).

Conclusions/Discussion: One in seven patients undergoing TME was upstaged on final pathology, and half of those patients would have been recommended neoadjuvant treatment based on final pathology. Factors associated with upstaging in this study seem primarily related to the anatomic location of the tumor. Whether staging can be improved by additional diagnostic imaging or whether preoperative counseling should be different in these patients needs to be studied prospectively.

PERINEAL WOUND CLOSURE AFTER INFRA LEVATOR PELVIC EXTENTERATION - IS A FLAP CLOSURE BETTER THAN PRIMARY CLOSURE?

P442

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Purpose/Background: Perineal wound complications following pelvic exenteration (PE) surgeries for carcinoma of rectum are common. Flap closure of perineal defects following PE is considered superior to primary closure in terms of perineal wound morbidity. However the evidence for this is not robust.

Methods/Interventions: The objective of this study was to compare the perineal wound morbidity rates with flap closure and primary closure of perineal defects following

PE. In this retrospective study of a prospectively maintained database, all patients undergoing PE surgery (either Total PE, or posterior exenteration in females) for locally advanced carcinoma rectum, at Tata Memorial Hospital, Mumbai, India, from June 2012 to July 2018 were analysed for perineal wound morbidity (wound gape/ infection). The primary variable analysed was the type of closure; others being, approach of surgery (MIS/open), pre-op RT, sacrectomy and anastomotic leaks.

Results/Outcome(s): Out of 86 patients who had undergone PE surgery, 32 (37%) had received a flap closure, and 54 (63%) had primary closure of their perineal defects. The rates of perineal wound complications were not significantly different between the flap closure and primary closure groups (50% vs 38.5%, p -value: 0.29). Major wound morbidity (gape requiring re-suturing/ flap closure, non-healing after 4 weeks, delay in adjuvant chemo) was seen in 29.4 vs 23.1% (p value: 0.51). Wound complications were not found to be significantly different when compared for other factors, like approach of surgery (MIS vs open: 30% vs 24%, p -value: 0.61), pre-op NACTRT (28.3% vs 19.2%, p -value 0.37), post-op anastomotic leak/perforation (20% vs 25.9%, p -value 0.77). Concomitant sacrectomy, though performed in a small number of patients (5/86 patients), was associated with a higher incidence of wound complications (80% vs 22.2%, p -value 0.04).

Conclusions/Discussion: Contrary to the prevalent notion, flap closure was not found to be better than primary closure of perineal defect following PE surgery in terms of perineal wound complications. Concomitant sacrectomy had an adverse effect, whereas approach of surgery, pre-op NACTRT and post op leak had no effect on perineal wound complications.

T AND N STAGING OF COLORECTAL CANCER: USEFULLNESS OF STRUCTURED MRI REPORT TEMPLATES PROPOSED BY THE EUROPEAN SOCIETY OF GASTROINTESTINAL AND ABDOMINAL RADIOLOGY (ESGAR).

P443

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Purpose/Background: The definition of T and N stage is crucial for a correct therapeutic management of patients with colorectal cancer. Nowadays, MR imaging is considered the best available tool for rectal cancer staging, allowing an accurate evaluation of the disease extent, up to, beyond and over the mesorectal fascia, and of the lymph nodes involvement. MRI is also routinely performed after neoadjuvant chemo-radiation therapy (nCRT) for the evaluation of the response to treatments and for surgical planning. In 2012, the European Society

of Gastrointestinal and Abdominal Radiology (ESGAR) initiated an expert consensus meeting on magnetic resonance imaging (MRI) for the clinical management of rectal cancer. In 2016, the ESGAR updated the previous recommendations and proposed a novel report template (both for primary staging and for restaging after nCRT) based on the additional information obtained by the diffusion weighted sequences in the MR protocol. Moreover, in the 2016 recommendation more attention was paid to the morphological and signal characteristic of the lymph node, in order to better identify the N stage. The aim of this study was to compare the 2012 and 2016 structured MRI report templates proposed by the European Society of Gastrointestinal and Abdominal Radiology (ESGAR), for the staging of the rectal cancer.

Methods/Interventions: Forty-seven consecutive patients (M:F, 34:13; mean age 63.9±12.4 years, range

30-86 years) affected by biopsy-proven rectal cancer were included in this retrospective study. Nineteen out of 47 had undergone nCRT (Capecitabine and Oxaliplatin, plus a total of 50.4Gy radiation dose) before surgery due to the locally advanced stage. All patients performed a MR examination within 20 days before surgery. In 44/47 cases the rectal anterior resection (RAR) was performed; in the remaining 3 cases the abdominoperineal resection (APR) was preferred. Twelve resections were performed by using the open-approach (10 RARs and 2 APRs), 10 by laparoscopy (all RARs) and 25 by the robotic-approach (24 RARs and one APR). A comparison between the radiological TN staging obtained according to the 2012 as well as the 2016 ESGAR guidelines, and the pathological TN staging was performed.

Results/Outcome(s): The radiological T stage did not differ between 2012 and 2016 ESGAR guidelines. In the

P441 Characteristics Examined for Relationship to Upstaging.

Preoperative Variable	Upstaged Patients (n=51)	Non-upstaged Patients (n=307)	Univariate p value	Multivariate p value
Female; n (%)	26 (51.0)	118 (38.4)	0.091	NS
Age, years; Mean (SD)	63.1 (12.6)	60.3 (12.4)	0.14	-
Body Mass Index; Mean (SD)	27.7 (6.7)	27.9 (6.0)	0.85	-
Preoperative Abdominal Surgery; n (%)	20 (39.2)	129 (42.6)	0.65	-
Preoperative Local Stage; n (%)*	-	-	-	-
I	27 (54.0)	46 (15.2)	<0.001	<0.01
II	11 (22.0)	34 (11.3)		<0.01
III	12 (24.0)	222 (73.5)		Reference
Staged by Ultrasound Only; n (%)	12 (24.0)	30 (10.0)	0.005	NS
Neoadjuvant Chemoradiotherapy; n (%)	23 (45.1)	241 (78.5)	<0.001	NS
Time from Neoadjuvant Therapy, weeks; Mean (SD)	6.0 (1.4)	12.0 (11.9)	0.49	-
Preoperative Diversion; n (%)	3 (5.9)	28 (9.1)	0.45	-
Tumor in Middle Third Rectum; n (%)	15 (30.6)	141 (49.1)	0.016	0.047
Tumor Position; n (%)**	-	-	-	-
Anterior (vs. non anterior)	9 (17.6)	98 (31.9)	0.039	0.029
Posterior	18 (35.3)	87 (28.3)	0.31	-
Lateral	14 (27.5)	93 (30.3)	0.68	-
Circumferential	9 (17.6)	61 (19.9)	0.71	-
ASA Class; n (%)	-	-	-	-
I	3 (6.0)	21 (6.9)	0.78	-
II	28 (56.0)	179 (58.9)		
III	18 (36.0)	102 (33.6)		
IV	1 (2.0)	2 (0.7)		
Albumin, g/dL; Mean (SD)	3.5 (1.0)	3.9 (0.5)	0.015	***
CEA, ng/mL; Mean (SD)	16.6 (31.8)	7.8 (20.0)	0.083	NS
Hemoglobin, g/dL; Mean (SD)	12.8 (2.6)	18.9 (91.2)	0.66	-
Creatinine, mg/dL; Mean (SD)	1.1 (1.1)	0.9 (0.9)	0.46	-
Estimated Blood Loss, mL; Mean (SD)	203 (229)	179 (258)	0.53	-

* Did not take into account presence of metastatic disease since this was not the focus of this study.

** Tumors could occupy more than one position so percentages may not sum to 100%.

*** Omitted from multivariate analysis due to high number of missing values and biologic implausibility.

directly resected group the radiological T stage was T1, T2, T3 and T4 in 1, 5, 20 and 2 patients, respectively. As to the patients who underwent nCRT, the radiological T stage was T0 (complete response without lesion detection or residual fibrotic tissue), T2, T3 and T4 in 4, 7, 6 and 2 patients, respectively. A statistical correlation was found between the radiological and pathological T stage ($p < 0.0001$; ρ of Spearman = 0.62). As to the radiological N stage, according to 2012 and 2016 guidelines no metastatic lymph nodes were found in 24 and 32 patients, respectively; N1 stage was assessed in 22 and 14 patients respectively. The N2 stage was assessed only in one patient, according to both guidelines. The pathological N stage was N0, N1 and N2 in 27, 16 and 4 patients, respectively. A statistical correlation was found between the radiological-pathological N stage comparison by applying both the 2012 ($p = 0.009$) and the 2016 guidelines ($p < 0.0001$); however, the updated 2016 version showed a stronger correlation (ρ of Spearman = 0.60).

Conclusions/Discussion: Both the 2012 and the 2016 ESGAR structured MRI report templates were reliable tools to assess the radiological T and N stage of the rectal cancer; the 2016 report template was more accurate in estimating lymph-nodes involvement.

ESTABLISHING A REGIONAL CYTOREDUCTIVE SURGERY AND HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY SERVICE: THE IMPERIAL COLLEGE LONDON EXPERIENCE.

P444

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Purpose/Background: The management of colorectal peritoneal metastases (CPM) is one of the most challenging conditions encountered in colorectal surgical oncology. Currently, only two supra-regional centres are nationally designated in the United Kingdom to treat patients with CPM. The aim of this study was to assess clinical outcome measures following the implementation of a cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) service at Imperial College London.

Methods/Interventions: All patients diagnosed at, or referred to, Imperial College London with CPM between July 2016 and September 2018 were included in this study. Clinical outcome measures analysed included: complete cytoreduction rate, concomitant operations at the time of CRS HIPEC, length of hospital stay, Clavien Dindo morbidity scores, anastomotic leak rate, procedure related mortality, disease free survival and overall survival.

Results/Outcome(s): Thirty-four patients (12 M: 22 F) with a median age of 59 (range 25 – 83) underwent CRS HIPEC within the study period. Median preoperative

Peritoneal Cancer Index was 9 / 39 (1-37) with 23 patients presenting with a primary tumour and synchronous CPM. Complete cytoreduction was achieved in 31 (91%) of patients. Two patients underwent liver resection at the time of CRS HIPEC, with a further patient undergoing pelvic exenteration at the time of cytoreduction. Median length of hospital stay was 11 (7-22) days. Median Clavien Dindo score was 0 (0-4), no anastomotic leaks occurred and no mortality was encountered in the study period. The median follow up period for the cohort is currently 8.3 months, with 27 (79%) of the 34 patients alive and 23 (68%) disease free.

Conclusions/Discussion: The presented data compare favourably with outcome measures reported by international centres of excellence, suggesting CPM patients can be safely managed closer to home in regional units that have the appropriate expertise. Nevertheless, management of this condition remains critically dependent upon a dedicated multidisciplinary team approach.

ROBOTICS CONFERS AN ADVANTAGE IN THE PRESERVATION OF UROLOGICAL FUNCTION AFTER RECTAL SURGERY.

P445

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Purpose/Background: Urogenital dysfunction after rectal surgery is mainly attributed to damage to the hypogastric and pelvic nerve plexuses, and further compounded by the effects of radiotherapy. While the introduction of total mesorectal excision (TME) and the emphasis on nerve-preserving techniques have reduced the impact on neurological function, the difficulty of rectal surgery remains evident from the rates of urinary and sexual dysfunction, ranging between 0-12% and 10-35%, respectively. One of the purported benefits of laparoscopy is the superior visualization of nerve plexuses allowing for their preservation, although studies have failed to show a significant improvement in urogenital function compared to open TME. Robotic rectal surgery, combining high-definition optics and ergonomic instrumentation, is hypothesized to provide superior nerve-preservation.

Methods/Interventions: Consecutive patients who underwent robotic surgery for rectal cancer by the senior author between July 2015 and July 2017 were matched in a 2:1 ratio with another group of patients who underwent similar procedures laparoscopically during the same period. Patients requiring para-aortic lymph node dissection, extended lymphadenectomy, and urological visceral resection for locally advanced tumors were excluded. The surgical procedure was standardized for all patients, adopting a medial-to-lateral vessel-first approach. The international prostate symptom score (I-PSS) was used to assess the urological function for all patients, whereas

the abbreviated international index of erectile function (IIEF-5) was only administered to sexually-active male patients. Sexual function in female patients were assessed using the Female Sexual Function Index (FSFI). The questionnaires were administered by the attending doctor to the patient during clinic consultations before surgery and postoperatively at 1, 3, 6 and 12 months after surgery.

Results/Outcome(s): A total of 60 patients were included in the analysis, with robotic surgery showing superior postoperative urological symptom scores and earlier return to baseline as compared to laparoscopy.

Conclusions/Discussion: Robotics confers an advantage in the preservation of urological function after rectal surgery.

RECONSTRUCTION OF THE PERINEAL DEFECT AFTER PELVIC EXENTERATION: COMPARISON OF THREE FLAP PROCEDURES.

P446

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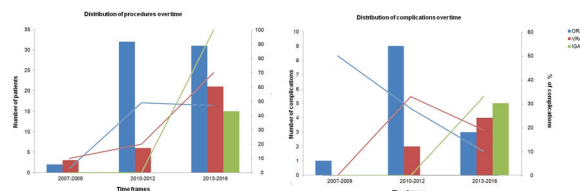
Purpose/Background: **Background:** Surgery for advanced or recurrent pelvic malignancy often results in perineal defects which cannot be closed by wound edge approximation. Myocutaneous flaps can fill the defect and accelerate healing, but they require expertise. No reconstruction has been proven to be superior to the others. **Objective:** To compare three flap procedures after pelvic exenteration.

Methods/Interventions: **Design:** Retrospective analysis of a prospective database, according to Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement. **Settings:** Tertiary Hospital. **Patients and Interventions:** Consecutive series of patients who required flap reconstruction after exenteration between 2007 and 2016. **Main Outcome Measures:** Complications and 3-year oncologic outcome after oblique rectus abdominis flap (ORAM) vs vertical rectus abdominis flap (VRAM) vs inferior gluteal artery perforator flap (IGAP).

Results/Outcome(s): **Results:** We included 65 (59%) oblique rectus, 30 (27.3%) vertical rectus, and 15 (13.7%) gluteal flap. Sacrectomy was performed in 12 (18.5%), 10 (33.3%), and 8 (53.3%) patients in oblique rectus, vertical rectus abdominis and gluteal flap ($p=0.016$). Preoperative radiotherapy was used in 60 (92.3%), 26 (86.7%), and 11 (73.3%) ($p=0.11$). Flap infection and dehiscence occurred in 7 (10.8%), 1 (3.3%), and 4 (26.7%). There was an increased risk with gluteal vs vertical rectus abdominis flap ($p=0.036$). Incisional/parastomal hernias were common in the latter. Gluteal flaps (OR 6.26, $p=0.02$) and obesity (OR 4.96, $p=0.02$) were associated with flap complications. Only complications of oblique rectus abdominis

flap decreased over time ($p=0.03$). Primary closure and oblique rectus abdominis flaps had lower rates of distant recurrence than vertical rectus abdominis and gluteal flaps ($p=0.04$). Flap-related complications increased the cumulative risk of death.

Conclusions/Discussion: **Limitations:** Retrospective, single-team study. **Conclusions:** The techniques appear comparable. Complications seem lower with VRAM, but it was associated increased risk of hernia. A survival gain can be anticipated only in uncomplicated flaps. The approaches should be considered complementary and choice individualized.



Distribution of the different procedures (left graph) and associated complications (right graph) over time during the three timeframes.

Squares represent the numbers of cases and complications, whereas lines show the trend. ORAM flaps were the most commonly performed. During the third timeframe a significant increase of VRAM was observed, and the team adopted IGAP flaps.

A trend toward a reduction of complications was observed in both ORAM and VRAM, but this was statistically significant only for ORAM ($p=0.033$ vs $p=0.78$ in VRAM).

ORAM = oblique rectus abdominis flap
VRAM = vertical rectus abdominis flap
IGAP = inferior gluteal artery perforator

NATIONAL TRENDS OF NEOADJUVANT TREATMENT FOR RECTAL CANCER: ANALYSIS OF A 10-YEAR PROSPECTIVE REGISTRY ON BEHALF OF THE SPANISH RECTAL CANCER PROJECT.

P447

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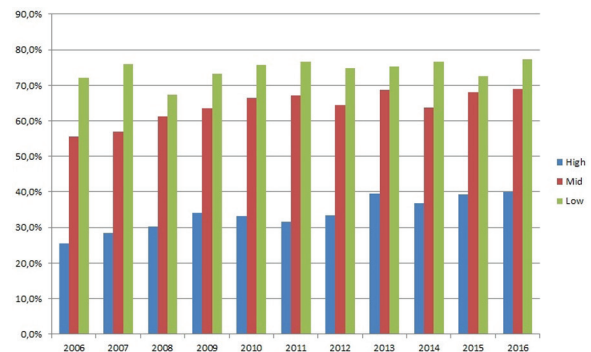
Purpose/Background: Neoadjuvant treatment for primary rectal cancer can enhance the chance of oncologic clearance after surgery. Over the last years, several preoperative treatment options have been proposed, while emphasis has been gradually shifted on developing risk-adjusted treatment strategies. Aim of this study was to assess the trends of preoperative treatment in patients with rectal cancer included in the national Rectal Cancer Registry of the Spanish Associations of Surgeons (Asociación Española de Cirujanos, AEC).

Methods/Interventions: This is a retrospective analysis of an online, prospectively maintained, national registry. As

a National quality improvement program, the AEC established in 2006 a National audit project in order to improve the outcomes of rectal cancer surgery. The project was named as “Viking” because it was inspired by the project from Norway and followed the same principles. Between 2006 and 2017, 105 Spanish hospitals joined the online registry with over 18000 patients prospectively included on a voluntary basis. For the purpose of the current analysis, we established three timeframes: I) 2006-2009; II) 2010-2013; and III) 2014-2017. Endpoints included the rates of neoadjuvant treatment in patients candidates to curative surgical resection of rectal cancers and type of treatments over 10 years. Likelihood of subsequent adjuvant treatment in these patients was assessed. Sub-analyses attempted at correlating neoadjuvant treatment with pathologic regression and rates of circumferential margin involvement. Results are presented as n (%) and mean (\pm standard deviation,SD). Chi squared test and Chi squared test for trends were used for categorical variables; Mann-Whitney test was used for continuous variables. Mantel-Haenszel test was used for pooled odds ratio in order to compare the timeframes. P value < 0.05 were considered statistically significant.

Results/Outcome(s): Overall, 14 391 patients underwent surgery for rectal cancer with curative intent between 2006 and 2017. Of them, 8871 (61.6%) received neoadjuvant treatment, consisting of – in those in whom the information was available – long course radiotherapy or chemoradiotherapy (7377, 79.9%), short course chemoradiotherapy (674, 7.6%), chemotherapy followed by radiation therapy (600, 6.8%), chemotherapy alone (93, 1%), and other modalities (126, 1.4%). The rate of patients receiving neoadjuvant treatment for cancer of the upper third (15-11 cm) increased over time, being 31.5%, 34.5%, and 38.6% in period I, II and III ($p=0.0018$). At pathology, 15.7% achieved complete regression, whereas 6.6% had no response. The rate of complete regression increased over time (15.6%, 16%, 18.5%; $p=0.0093$). The rates of involved circumferential resection margins after neoadjuvant treatment decreased over time ($p=0.0004$). However, no significant lower R+ rates overall were observed comparing the three timeframes with vs without neoadjuvant therapy (OR 0.88, 0.64-1.20, Mantel-Haenszel $P=0.42$); conversely, significant lower R+ rates were observed over the timeframes with neoadjuvant treatments in patients with cancers of the lower third (OR 0.71, 0.59-0.87, Mantel-Haenszel $P=0.0008$). The mean number of retrieved nodes was lower after neoadjuvant treatment vs no neoadjuvant treatment (13.2 ± 8.5 vs 16.4 ± 9.9 , $p<0.0001$), with no significant differences in positive node ratio. Of those who received neoadjuvant treatment, 76.4% also received postoperative treatment, the rate being stable over the timeframes. Most pN0 patients after neoadjuvant treatment also received adjuvant therapy in all the timeframes (72.1%, 73%, 69.7%, $p=0.262$).

Conclusions/Discussion: The majority of patients with rectal cancers included in the Spanish AEC registry received neoadjuvant treatment. We observed an increasing trend of neoadjuvant treatment being offered to patients with cancer of the upper rectum. The analyses of margin status suggested a potential overuse of the treatment in this subset of patients. Most patients received adjuvant treatment after preoperative therapy, even after achieving pN0, although there is no definitive evidence to support such approach. These figures need to be addressed in order to optimize the outcome of rectal surgery.



Trends of neoadjuvant treatment over time in patients included in the Spanish AEC rectal cancer registry over 10 years, according to the site of rectal cancer (upper, middle, low rectum). (AEC, Asociación Española de Cirujanos)

MAJORITY OF PATIENTS UNDERGOING COLORECTAL CANCER RESECTION FROM 2010-2018 HAVE NOT PARTICIPATED IN COLORECTAL SCREENING PROGRAMS.

P448

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Purpose/Background: The incidence and mortality of colorectal cancer (CRC) has steadily decreased over the past decade and is attributed to increased participation in CRC screening programs. To assess what proportion of patients undergoing initial CRC resection are symptomatic at the time of presentation and have participated in CRC screening, a retrospective analysis was performed on a cohort of patients who consented to donate surgical remnant tissue to a database called the Stony Brook University GI Clinical Shared Resource.

Methods/Interventions: The Stony Brook University Institutional Review Board (IRB 1307244, IRB 163184) approved this study. Existing clinical data collected between 2010-2018 by the Stony Brook University GI Clinical Shared Resource was analyzed using SPSS and GraphPad Prism. Surgical patients that consented to participate in the study were informed of the study's objective to build a longitudinal clinical database of digestive disease-related tissue and blood specimens. The identifying

information from patient samples and clinical information were stripped upon collection and linked by a patient and sample code in RedCap. Subjects at high risk for CRC (hereditary syndromes, inflammatory bowel diseases) were excluded. The following three categories of subjects were compared: 1. Symptomatic on diagnosis with no previous CRC screening; 2. Asymptomatic on diagnosis; 3. Interval or symptomatic but adherent to United State Preventive Task Force (USPTF) CRC screening recommendations. The threshold of significance for unadjusted p-values was set as $p \leq 0.05$.

Results/Outcome(s): As shown in Table 1, 284 patients met the inclusion criteria. 71.5% of patients were symptomatic on presentation without previous CRC screening and 13.7% had interval cancers. 15.1% of patients were asymptomatic and diagnosed during a CRC screening procedure. 13.4% of patients were early onset (age < 50 on diagnosis). There was a higher proportion of advanced stage cancer in symptomatic patients (see Table 1). A higher proportion of Hispanics (9 of 35 total) were diagnosed with early onset CRC compared to non-Hispanic Whites (26 of 228 total, $p = 0.03$).

Conclusions/Discussion: While CRC screening has decreased colorectal cancer incidence, seventy percent of patients undergoing initial CRC resection at this center had not participated in CRC screening and had more advanced stage on diagnosis. Although the numbers are small, our data suggests that Hispanics may have a higher proportion of early onset CRC.

Table 1. Demographics	Symptomatic	Asymptomatic	Interval	Total (n)	p-value
	n = 202	n = 43	n = 39	n=284	
Gender					p = 0.46
Male (M)	125 (61.9)	26 (60.5)	20 (51.3)	171	
Female (F)	77 (38.1)	17 (39.5)	19 (48.7)	113	
Race					p = 0.47
African American (AA)	10 (5.0)	1 (2.3)	3 (7.7)	14	
Caucasian (C)	177 (87.6)	42 (97.7)	35 (89.7)	224	
Asian Pacific Islander (API)	10 (5.0)	0	0	10	
Other (O)	5 (2.5)	0	1	6	
Ethnicity					p = 0.51
Hispanic	27 (13.4)	3 (7.0)	5 (12.8)	35	
Non-Hispanic	175 (86.6)	40 (93.0)	34 (87.2)	249	
Age at Diagnosis					p = 0.018
<50	32 (15.8)	1 (2.3)	2 (5.1)	35	
>50	170 (84.2)	42 (97.7)	37 (94.9)	249	
Status					p = 0.4
Alive	125 (61.9)	33 (76.7)	23 (59.0)	181	
Deceased	38 (18.8)	4 (9.3)	8 (20.5)	50	
Unknown	39 (19.2)	6 (13.0)	8 (20.5)	53	
Stage					p = 0.001
0/1	38 (18.8)	21 (48.8)	11 (28.2)	70	
2	60 (29.7)	6 (14.0)	10 (25.6)	76	
3	75 (37.1)	15 (34.9)	13 (33.3)	103	
4	29 (14.3)	1 (2.3)	5 (12.8)	35	

Table 1. Demographics

A PROPOSAL FOR STANDARDS OF HISTOPATHOLOGY REPORTING FOR D3 LYMPHADENECTOMY IN RIGHT COLON CANCER: THE MESOCOLIC SAIL AND SUPERIOR RIGHT COLIC VEIN LANDMARKS.

P449

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Valencia, Spain

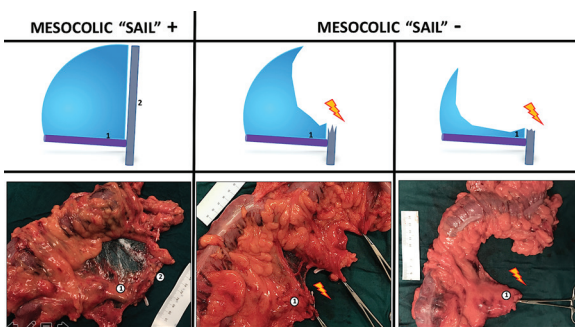
Purpose/Background: The concept of complete mesocolic excision (CME) has been introduced with the aim of standardizing the surgical technique of colonic resection eventually improving oncologic outcomes, in a similar fashion as with total mesorectal excision (TME) for rectal cancer. The aim of this study is to define new, reproducible anatomopathological standards of specimen quality assessment and reporting as obtained from the surgical specimen when an oncologic right hemicolectomy with D3-Lymphadenectomy (D3-L) has been correctly performed.

Methods/Interventions: The current research has been carried out in two different phases. The first part consisted of a cadaver-based study of right colon anatomy, and the second part consisted of a prospective assessment of a series of surgical specimens obtained after right hemicolectomy. First phase: Dissections of cadavers were carried out by a colorectal surgeon with expertise in applied human anatomy supervised by a human anatomist. In all cadavers an oncologic right hemicolectomy was simulated, attempting CME and D3-L. The specimens obtained with the simulated operations were assessed with a pathologist, with the aim of identifying all structures which were present after a correct D3-L. Second phase: Prospective anatomopathological study of the specimens obtained after right hemicolectomy at a Colorectal Unit of a tertiary hospital for cancer of the caecum, ascending colon, or hepatic flexure between March 2017 and March 2018. In each specimen, the pathologists systematically looked for anatomic structures defined as possible markers of quality (quality standards) of the D3-L during the first phase. According to the presence or absence of these structures, specimens were classified as Complete D3-L (all structures identified), Partial D3-L (at least one) and Incomplete D3-L (no structure identified). The number of nodes in the D3-L area was assessed as well as the rate of positive nodes in the same area and were included for TNM classification.

Results/Outcome(s): First phase: Seventeen cadavers were used for the aim of the study, five fresh cadavers and twelve formalin-fixed cadavers. Two anatomical structures were identified which were constantly present in the specimen if the D3-L was correctly performed: The "Right mesocolic Sail": avascular mesocolic area with no lymphoadipose tissue was found, located between the

pericolic fat and the lymphoadipose tissue covering the superior mesenteric vein. The trunk of the superior right colic vein (SRCV). Second phase: Median age of patients was 78 (49-91) years, 32 (49.2%) women. Overall, we examined 65 surgical specimens. Specimens were classified as: Complete D3-L: *Right Mesocolic Sail* + and trunk of SRCV +, Partial D3-L: one of these two parameters and Incomplete D3-L: no structure identified. We classified as "Incomplete D3-L" 13 specimens (20%), "Partial D3-L" 20 specimens (31%), and "Complete D3-L" 32 specimens (49%). A median number of 14 (6-64), 22 (11-47), and 29 (14-55) lymph nodes was isolated in "Incomplete D3-L", "Partial D3-L" and "Complete D3-L" specimens, respectively ($p=0.01$). The median numbers of lymph nodes isolated in the area of D3-L, was 0 in "Incomplete D3-L", 1 (0-5) in "Partial D3-L", and 3 (0-8) in "Complete D3-L" specimens ($p=0.0001$). Positive nodes were found in 24 patients, only one was found with a positive node in the D3-L area. Operative time was in "Complete D3-L" (median 220 minutes) compared with "Partial D3-L" (median 180 minutes) and "Incomplete D3-L" (median 165 minutes, ($p=0.07$)). There was no postoperative mortality. There were no differences in terms of postoperative complications among the three groups. Anastomotic leak (6%), and postoperative bleeding occurred in three patients in the "Incomplete D3-L" group (23%) and in two in "Complete D3-L" group (6.25%). Median hospital stay was 8 (4-30) days. The pathology report was adenocarcinoma in 56 (86.1%) patients and adenoma with dysplasia in 9 (13.8%). T1 (4.6%), T2 (18.4%), T3 (30.7%), T4a (26.1%), and T4b (6.1%).

Conclusions/Discussion: This is the first study to describe replicable, consistent pathological findings which can be used as reference standards to assess the quality of D3-L oncologic right hemicolectomy. Under the lights of the recent evidences of the complex role of the mesentery in disease initiation and progression (30), we anticipate that the parameters constituting our classification might improve the current CME assessment. A technically correct surgical *geste* remains the mainstay of treatment of right colon cancer, but consistent specimen assessment and replicable standards of reporting, based on profound knowledge of human anatomy, represent equally important pillars when it comes to assessing the outcomes of a surgical procedure.



ANAL SQUAMOUS CELL CARCINOMA IN THE HIV POSITIVE POPULATION: A 15-YEAR CASE SERIES FROM AN URBAN TERTIARY CARE CENTER.

P450

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Purpose/Background: The Nigro protocol introduced in the 1970's is now the standard of care for squamous cell carcinoma (SCC) of the anus. Multiple studies have found local failure rates of 15-20%, with patients subsequently undergoing salvage abdominoperineal resection (APR). Furthermore, patients have been found to have 60-70% disease free survival at five years. During the HIV epidemic in the 20th century, HIV patients were noted to have significantly increased rates of anal SCC. However, it is unclear whether they have worse outcomes once they are diagnosed with anal SCC. This study evaluates the initial treatment failure and local recurrence rates in the HIV positive population.

Methods/Interventions: All cases of anal squamous cell carcinoma diagnosed between the years 2004 and 2018 at a single academic medical center were reviewed. Patients with documented HIV positivity and completed treatment course were included. In total, 24 patients were included. Patient demographics, HIV disease and cancer characteristics, treatment course, and outcomes were reviewed.

Results/Outcome(s): Of the 24 patients included, 23 patients had primary anal squamous cell carcinoma, 1 patient had combined extensive penile and anal squamous cell carcinoma. The average age at diagnosis was 47.1 (SD 10.9). 21 of 24 patients had recorded CD4 levels at diagnosis, with average being 344 (SD 223), 19 of 24 patients had recorded viral load (VL), of these patients 13/19 had VL <100, 3/19 had VL 100-1000, and 3/12 had VL >1000 at time of diagnosis. At initial diagnosis, 2/24 presented as tumor in situ, 6/24 presented as Stage I, 5/24 as Stage II, 8/24 presented as Stage III, and one patient presented as Stage IV. Two patients presented only for their recurrence and had unknown initial stage. For initial treatment, the patient with combined penile/anal cancer had primary resection, 22/23 remaining patients underwent combined chemoradiation with mitomycin/5 Fluorouracil, and one patient underwent chemoradiation with mitomycin/capecitabine. For patients that underwent chemoradiation, 2/23 patients (8.6%) had an incomplete initial response, and 3/23 patients (13%) had a recurrence. For two patients who had incomplete initial treatment response, both underwent APRs with no subsequent recurrence. For the patients who had a recurrence, one underwent APR in 2014 with death in 2016, 1 transitioned to hospice and died thereafter, and one had additional chemoradiation for metastases to bone and died within the year.

Conclusions/Discussion: Patients with HIV have increased rates of anal squamous cell carcinoma, but they do not appear to have increased initial treatment failure rates requiring salvage surgery, or increased recurrence rates.

LARGE INFRA-LEVATOR MAMMARY-TYPE MYOFIBROBLASTOMA IN A SUPER OBESE WOMAN (BMI > 60 KG/M²).

P451

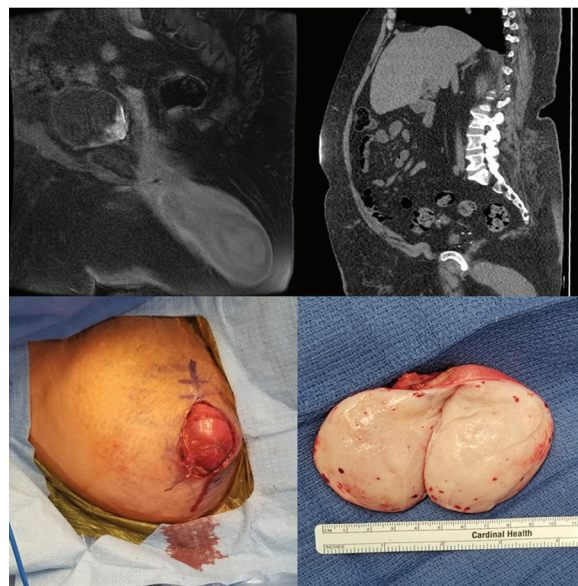
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Purpose/Background: Mammary-type myofibroblastoma is an uncommon mesenchymal tumor of the breast which affects woman and men. The extra-mammary type is an even more rare benign tumor which has morphologic and immunohistochemical features identical to those in the breast but in different locations. There is speculation that these lesions arise along the embryonic mammary line that extend from mid-axilla to medial groin. They are typically slow growing, well-circumscribed, and asymptomatic.

Methods/Interventions: The patient is a 52 year old super obese woman (BMI 64.5 kg/m²) who presented with a bothersome right-sided buttocks mass. The lesion had been gradually enlarging on serial CT imaging since 2010. A recent MRI demonstrated a large T1 enhancing pedunculated mass within the right medial gluteal fold abutting the distal rectum and anus and measuring 14 x 7 x 5 cm. This carried a broad differential including a neurogenic or mesenchymal neoplasm. A colonoscopy did not reveal an intra-luminal lesion. A CT-guided core needle biopsy demonstrated a benign mesenchymal neoplasm with smooth muscle differentiation, or leiomyoma. She was taken to the operating room for elective resection.

Results/Outcome(s): In lithotomy position, the rubbery and mobile mass was palpable in the right ischio-rectum near the anus. It was excised with clear margins and the patient was discharged home the same day. Grossly, the 15.7 x 8.2 x 4.2 cm tan, rubbery mass was well-demarcated but unencapsulated, weighing 170 grams. Histologically, the mass was relatively hypocellular with collagenized proliferation of bland, elongated, spindle cells adjacent to skeletal muscle. The spindle cells were arranged in long vague fascicles and created a pattern of alternating cellularity. There were no mitoses or necrosis. Immunohistochemical stains showed the cells were negative for CD34, positive for desmin, and positive for ER. In addition, the lesion was negative for S100, SMA, CD68, h-caldesmon, CD117, AE1/3, CAM5.2, and MDM2. These findings are consistent with a mammary-type myofibroblastoma. After resection, the vague right buttocks pain resolved and there has been no evidence of recurrence 6 months later.

Conclusions/Discussion: Extramammary mammary-type myofibroblastoma is a rare benign tumor which can occur anywhere in the body but most commonly along the embryonic milk line. Though usually asymptomatic with no malignant potential, the mass can become symptomatic when it is larger or in an inopportune location. Even in the class III super obese patient, resection is safe and can be therapeutic.



- A. MRI pelvis, T1
- B. CT abdomen and pelvis
- C. intra-operative surgical resection
- D. gross specimen

SHORT TERM OUTCOMES OF STENTS IN OBSTRUCTING RECTAL CANCER. SYSTEMATIC REVIEW AND META-ANALYSIS.

P452

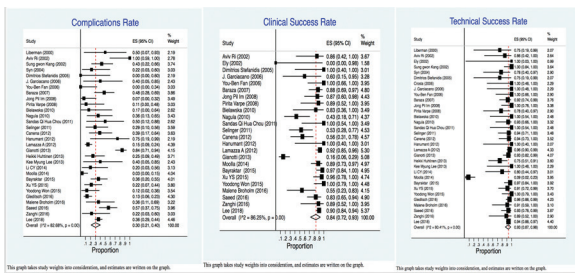
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Purpose/Background: Acute malignant colorectal obstruction is an emergency that requires surgical intervention. However, emergent surgery is associated with relatively high morbidity and mortality rates. Self-expandable metal stents (SEMS) have been used as an alternative to surgery in patients presenting with acute obstruction either as a bridge to surgery or as a palliation for malignant colorectal obstruction. The anatomical variation of the rectum makes it technically more challenging to manage and there has been questioning of its safety. **Aim:** This study aimed to review the literature and assess outcomes including complication rates of stent placement in patients presenting with rectal or recto-sigmoid obstruction due to primary malignant tumors.

Methods/Interventions: Method:We conducted a literature search of electronic database using PubMed. Keywords included: ‘rectal cancer’, ‘colorectal obstruction’ and ‘stent’. Outcomes of interest were technical and clinical success rates, complication rate (including perforation, tumor overgrowth, migration and bleeding), need for operation or endoscopic re-intervention. Quality of published studies was assessed using a quality checklist.

Results/Outcome(s): Result: The original search strategy identified 962 articles; only 32 matched our inclusion criteria and were included in the final analysis. Total number of patients among all included studies was 739. Among these, 117 patients (15.83%) had stent placement for palliation and 87 patients (11.77%) as bridge to surgery. Pooled technical success rate across all studies was 93% (87%-98%) and clinical success rate was 84% (72%-93%). The pooled overall complication rate was 30% (21%-40%). Among 739 patients, 75 patients had obstruction (10.15%), 66 patients had migration (8.93%), 30 patients had pain (4.05%), and 22 patients had perforation (2.98%). Twenty-eight patients (3.79%) needed endoscopic re-intervention and 44 patients (5.95%) needed surgery after stent failure. With regards to the quality of included studies, the score range was (7-14). 18.75% of the studies had a score above 12.

Conclusions/Discussion: Conclusion: Rectal stent for obstructing rectal-recto sigmoid tumors seems to be technically feasible, however, high technical success rate is not always translated into clinical success. There is a considerable complication rate associated with it. The data are extremely heterogeneous and definitive conclusions cannot be made. Randomized controlled trials comparing rectal stent to surgery are needed.



VALIDATION OF OPERATIVE PROCEDURES AFTER NEOADJUVANT CHEMORADIO THERAPY IN TERMS OF CRM.

P453

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Purpose/Background: (Introduction) Neoadjuvant chemoradiotherapy (NACRT) followed by TME surgery has been widely accepted as a standard treatment options for the intermediate -advanced risk rectal cancer. On the other hand, surgery (TME) alone is recommended for the

good risk tumor. (Purpose) We examine the validity of indication of operative procedure for the middle to low rectal cancer in terms of pathological CRM.

Methods/Interventions: (Patients and Methods) From March 2017 to April 2018, 23 cases of middle to low rectal cancer underwent laparoscopic surgery. We have adapted NACRT for the patients whose pretreatment MRI revealed any one of the following criteria, 1) 1 mm> CRM, 2) > cN 1 b, 3) EX (+). The operative procedure was indicated on the basis of 1 mm %CRM in the MRIT 2 images after treatment. Ten cases of them underwent NACRT (R group: 45-50.4 Gy; 1.8 Gy x 25-28 +/- TS1) and 13 cases of them underwent surgery alone at the same period (S group) (Table 1). The specimen MRI (smri) CRM and pathological CRM values were measured in all patients and values of CRM before and after CRT were measured in R group. The Specimen MRI was used in order to know the final effects on the tumor of NACRT. The CRM values besides pCRM were defined as the closest distance between the viable tumor cells and the mesorectal fascia. The pCRM value was defined as the closest distance to the dissection plane of the specimen.

Results/Outcome(s): (Results) The R group: n=10 (APR 2, TPE 1, LAR 7): preCRT CRM 0 mm (0 - 6.5), post CRT CRM 2.4 mm (0 - 12), smri CRM (examined for LAR cases only) 3mm (0.96-11.75), pCRM 5.2mm(0.8-13.0) 1mm> pCRM was revealed in 1cases (LAR1). S group (LAR 13): invivo CRM 3.9 mm (1.2-32), smriCRM 3.0 mm (1.0 - 13.6), pCRM 4.0 mm (0.2 - 21.0). Pre CRT CRM of R group was significantly shorter than that of S group (p= 0.01128), but post CRT of R group and in vivo CRM in S group had no difference between the groups (p= 0.70844). Neither smriCRM (p= 0.968) nor pCRM (p= 0.45564) had no difference between the groups. Two cases of S group and one case of R group encountered positive CRM (<1mm) and these tumors were located at the anterior of the rectum. Spearman’s rank correlation coefficient revealed a strong correlation between the pCRM and in vivo MRI CRM, smri CRM, in the LAR cases. Single regression analysis revealed it was not easy to estimate the pCRM value from invivo MRI CRM (r=0.099, p=6936).

Conclusions/Discussion: (Conclusion) Preoperative MRI could predict whether the CRM negative TME surgery is possible or not. The NACRT improves the possibility of pCRM-negative TME surgery even for the CRM threatening cases. However, indication of LAR should be taken into consideration carefully in such cases.

Table1: Patients characteristics

	Total	group R	group S	p	
n	23	10	13		
Gender	M/F	9/1	4/9	n.s.	
Age	years*	67	67	n.s.	
BMI	kg/m2	22.5	22.9	n.s.	
AV	cm	2.0	5.0	0.00881	
cT	1/2/3/4b	1/1/3/18	0/0/6/4	1/3/8/1	0.019
cStage	I/IIA/IIIB/IIIC/IVa/IVb	1/1/3/11/5/1/1	0/1/1/3/4/0/1	1/0/2/8/1/1/0	0.227
op.procedure	LAR/APR/TPE	20/2/1	7/2/1	13/0/0	0.1061

DOES IT MATTER WHERE YOU GET YOUR SURGERY FOR COLORECTAL CANCER?

P454

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Purpose/Background: Colorectal Cancer (CRC) is the third most common Cancer in the United States and the third most common cause of cancer-related deaths. The overall incidence of CRC has declined in the last few decades. The influence of hospital-related factors on outcomes following colorectal surgery is not well-established. The aim of our study was to evaluate the relationship between hospital factors on outcomes in surgically managed colorectal cancer patients.

Methods/Interventions: We performed a 2-year (2014-2015) analysis of the National Inpatient Sample database. Adult (>18y) patients who underwent open or laparoscopic colorectal resection were identified using ICD-9 codes. Patients were stratified based on hospital: volume (low vs. high), teaching status, and location (urban vs. rural). Outcome measures were complications and mortality. Multivariate logistic regression was performed.

Results/Outcome(s): A total of 153,453 patients with CRC were identified of which 35.3% (n=54,220) underwent surgical management. Mean age was 69 ± 13y, 51.6% were female, and 67% were white. The overall rate of in-hospital complications was 29% and overall mortality was 3.8%. 27% of the patients were managed at a high volume center, 48% were managed at intermediate volume center while 25% of the patients underwent surgery at a low volume center. Teaching activities were conducted in 45% of the hospitals and majority of the hospitals (85%) were located in urban areas. Complications and mortality rates were lower in patients who were managed at high volume centers and urban hospitals, while no difference was noticed based on teaching status (**Table 1**). On multivariate logistic regression, patients managed at high volume centers (OR: 0.76 [0.56-0.89]) and urban hospitals

(OR: 0.83 [0.64-0.91]) have lower odds of complications similarly high volume centers (OR: 0.79 [0.65-0.90] and urban facility (OR: 0.87 [0.70-0.92], were associated with lower odds of mortality. However, there was no association between teaching status and outcomes.

Conclusions/Discussion: Hospital factors significantly influence outcomes in patients with CRC managed surgically. High volume centers and urban facilities have relatively better outcomes. Therefore, regionalization of care along with the appropriate availability of resources may improve outcomes in patients with CRC.

SURGICAL OMISSION IN LOCALLY ADVANCED RECTAL CANCER: RACIAL AND SOCIOECONOMIC DISPARITIES.

P455

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Purpose/Background: Treatment for locally advanced rectal adenocarcinoma is typically neoadjuvant chemoradiotherapy (nCRT) followed by surgery and adjuvant chemotherapy. It has been previously recognized that there are significant disparities in the use of neoadjuvant and adjuvant therapy along racial and socioeconomic lines, though little has been evaluated regarding disparate use of surgery following completion of nCRT. Additionally, while recent literature suggests that omitting surgery following nCRT in patients with a complete clinical response may be a safe approach, it unclear how this has translated into actual practice. We used the National Cancer Database (NCDB) to evaluate the recent patterns of and disparities associated with omission of surgery following nCRT.

Methods/Interventions: We performed a retrospective review of the NCDB between 2004 and 2015. Adult patients with clinical Stage II or Stage III rectal adenocarcinoma who received nCRT were included. Patients

P454 Table 1. Hospital-Level Factors and Outcomes

	Low Volume (n=13,555)	High Volume (n=14,639)	P-Value
Hospital Volume			
Complications	34%	21%	0.01
Mortality	4.5%	2.2%	0.03
Hospital Location	Rural (n=8,133)	Urban (n=46,087)	P-Value
Complications	39%	27%	0.01
Mortality	6.5%	3.2%	0.02
Teaching Status	Non-Teaching (n=29,821)	Teaching (n=24,399)	P-Value
Complications	29%	28%	0.43
Mortality	3.9%	3.6%	0.67

were then stratified into two groups: those who underwent surgery after nCRT and those who did not. Patients who did not undergo surgery because of comorbidities or due to patient refusal were excluded. The non-surgical cohort only included patients where surgery “was not part of the planned first course of treatment” according to the NCDB data. Multivariate regression analysis was performed to identify factors associated with omission of surgery.

Results/Outcome(s): 58,899 patients were identified; of these patients, 6,160 (10.5%) did not receive surgery following nCRT. During the study period, there was a small increase in the rate of patients not receiving surgery. Between 2004-06, 10.4% of patients did not receive surgery, compared to 11.2% between 2013-15 ($p<0.001$). The rate of surgical omission was highest at community cancer programs and remained stable during the study period (2004-06 15.4%, 2013-15 15.6%, $p=0.83$). At academic cancer centers, the rate of surgical omission was significantly lower, and increased slightly over the study interval (2004-06 10.1%, 2013-15 11.8%, $p<0.001$). The odds of surgical omission increased steadily with increasing age (table 1). Black patients (OR 1.62, 95% CI 1.47-1.78, $p<0.001$) and

Hispanic patients (OR 1.28, 95% CI 1.14-1.43, $p<0.001$) were more likely to not proceed to surgery than white patients. Additionally, patients from the lowest socioeconomic stratum were almost 20% more likely to not undergo surgery (OR 1.18 95% CI 1.08-1.28, $p<0.001$). Uninsured patients (OR 1.89, 95% CI 1.66-2.15, $p<0.001$) and patients on Medicaid (OR 1.57, 95% CI 1.40-1.76, $p<0.001$) were also more likely not have surgery than privately insured patients. Finally, the odds of patients treated at a community cancer center never undergoing surgery were over 75% higher than the odds for patients at an integrated cancer center (OR 1.76, 95% CI 1.56-1.98, $p<0.001$).

Conclusions/Discussion: Despite a significant interest in the literature and in academic discussions surrounding omission of surgery for patients with a complete clinical response after nCRT, our analysis demonstrates only a very slight increase in actual surgical omission between 2004 to 2015. More importantly, our data indicate that among the 10% of patients who completed nCRT and did not proceed to surgery, minorities, uninsured patients, patients of lower socioeconomic status, and patients treated at community cancer centers were significantly overrepresented. It is

P455 Table 1: Multivariable analysis – Adjusted Odds of No Surgery

		Odds Ratio	95% CI	p value
Year	2004-2006		Reference	
	2007-2009	0.93	0.85, 1.03	0.18
	2010-2012	0.96	0.88, 1.05	0.37
	2013-2015	1.12	1.03, 1.22	0.01
Age (years)	<50		Reference	
	50-59	1.06	0.96, 1.18	0.24
	60-69	1.39	1.25, 1.55	<0.001
	70-79	1.91	1.70, 2.16	<0.001
	80+	5.82	5.13, 6.61	<0.001
Race	White		Reference	
	Black	1.62	1.47, 1.78	<0.001
	Hispanic	1.28	1.14, 1.43	<0.001
	Other	1.12	0.98, 1.29	0.09
	Unknown	1.76	1.31, 2.38	<0.001
Insurance	Private		Reference	
	Medicare	1.23	1.14, 1.34	<0.001
	Uninsured	1.89	1.67, 2.15	<0.001
	Medicaid	1.57	1.39, 1.76	<0.001
	Unknown	1.82	1.58, 2.09	<0.001
Facility Type	Integrated Network Cancer Program		Reference	
	Academic/Research Program	1.12	1.02, 1.23	0.02
	Comprehensive Community Cancer Program	1.11	1.01, 1.22	0.03
	Community Cancer Program	1.76	1.56, 1.98	<0.001
Median Income (USD)	\$63,000+		Reference	
	\$48,000-\$62,000	0.96	0.89, 1.04	0.29
	\$38,000-\$47,999	0.94	0.88, 1.03	0.19
	< \$38,000	1.18	1.08, 1.28	<0.001

unlikely that these patients have planned omission of surgery due to complete clinical response to nCRT; rather, historically underserved populations may have proceeded to surgery after nCRT at a lower rate because of differential access to, recommendations for, and, in some cases, acceptance of, appropriate surgical care. While the precise reason for the observed differences in the rate of surgical omission cannot be gleaned from these data, the observed trend suggests ongoing inequities in access to surgical care that warrant further investigation.

A SCORING SYSTEM FOR REGIONAL LYMPH NODE METASTASES IN PATIENTS WITH YPT0-2 RECTAL CANCER AFTER PREOPERATIVE CHEMORADIATION: ORGAN PRESERVATION OR COMPLETION SURGERY.

P456

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Purpose/Background: Lymph node status for ypT0-2 rectal cancer determines the surgical decisions for organ preservation or salvage surgery after preoperative chemoradiotherapy (CRT) and local excision. However, there are few studies to predict ypN0 in patients with ypT0-2 rectal cancer after CRT. This study was to build a scoring system to select patients with negative nodal stage for ypT0-2 rectal cancer after CRT.

Methods/Interventions: Between 2010 and 2018, we collected patients with middle and low rectal cancer received CRT and radical surgery. Here, we selected the clinicopathological data associated with regional lymph node metastases for patients with stage ypT0-2. After that, we used the receiver operating characteristic curves to evaluate the independent predictive factors and incorporate them into a scoring system.

Results/Outcome(s): Five hundreds and eleven patients were stage ypT0-2 and 72 patients (14.1%) had regional lymph node metastases. For patients with a stage ypT0-2 tumor smaller than 2cm, the pre-treatment Carbohydrate Antigen 19-9 (CA19-9) more than 37 IU/ml ($p=0.005$) and ypT2 category ($p=0.048$) were independent risk factors for lymph node metastases. For patients with stage ypT0-2, multivariate analyses showed that pre-treatment CA19-9 more than 37 IU/ml ($p=0.036$), residual tumor diameter ($p=0.038$), ypT category ($p<0.001$), and lymphovascular invasion ($p=0.042$) were independently associated with regional lymph node metastases. When we established a four-factor scoring system to predict nodal metastases for ypT0-2, the area under the curve was 0.720 (Figure 1).

Conclusions/Discussion: We demonstrated that pretreatment CA19-9, the residual tumor diameter, ypT stage, and lymphovascular invasion were associated with lymph node metastases for ypT0-2 rectal cancer after

CRT. Validation of the results may be helpful for surgical decisions of organ-sparing or completion surgery after CRT in future.

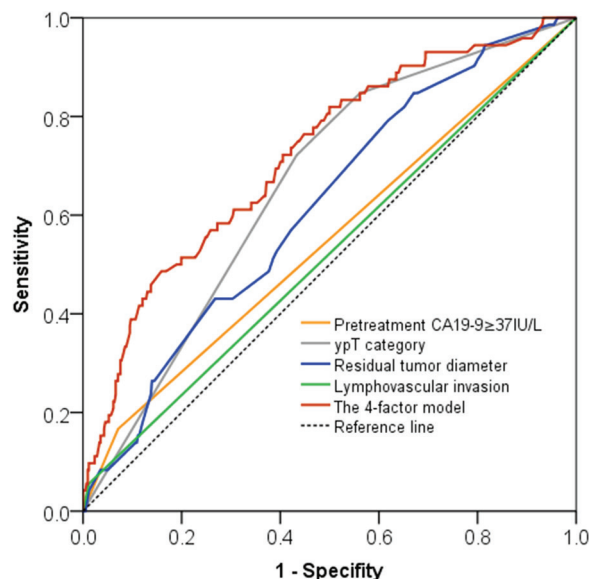


FIGURE 1. The ROC curves of different models to predict lymph node metastasis for ypT0-2

APPLICATION OF MRI IN HEIGHT MEASUREMENT OF LOW-MIDDLE RECTAL CANCER AND ASSESSMENT OF SPHINCTER PRESERVATION IN MEN AND WOMEN.

P457

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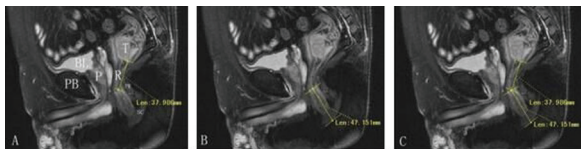
Purpose/Background: Accurate measurement of the height of rectal tumors is critical to the choice of patient treatment options, but there is currently no standard measurement method. In this study, the height of rectal tumors was measured by magnetic resonance imaging (MRI), and the application value of MRI in predicting sphincter preservation and whether there was any difference between male and female anal sphincter were evaluated.

Methods/Interventions: Retrospective analysis of 2010.01-2018.07 data on rectal cancer patients in the Department of Colorectal Surgery and General Surgery of Jiangsu Provincial Hospital of Traditional Chinese Medicine. All patients underwent preoperative MRI and underwent radical rectal cancer surgery. Radiologists measured the distance from the distal edge of the rectal tumor to the anorectal ring (ARR) and the anal verge (AV) by MRI. The distance from the distal edge of the tumor described by colonoscopy and digital rectal examination (DRE) to AV was recorded. The accuracy of MRI, colonoscopy and DRE measurements was analyzed

by ROC curve. Assessment of distance difference for sphincter preservation based on the cut-off value.

Results/Outcome(s): One hundred and fifty-two patients with rectal cancer were included in the study. Among them, 111 cases were males, 41 cases were females, the average age was 61 ± 12 years. One hundred and twenty-eight patients underwent open surgery and 24 underwent laparoscopic surgery. One hundred and eleven cases underwent sphincter preservation procedures, and 41 cases underwent non-sphincter preservation procedures. Sixty-three patients had complete data of MRI, colonoscopy and DRE. In the comparison of different methods in sphincter preservation feasibility assessment, accuracy of MRI was higher than colonoscopy and DRE when measured from AV, with AUC values of 0.800 (95%CI, 0.680-0.890), 0.698 (95%CI, 0.569-0.807), and 0.715 (95%CI, 0.587-0.821), respectively. ARR was more accurate than AV, with AUC values of 0.842 (95%CI, 0.729-0.922) and 0.800 (95%CI, 0.680-0.890). In the comparison of MRI measurement of ARR vs AV in 152 cases of sphincter assessment, the distance from tumor distal edge to ARR was more accurate than AV, with AUC values of 0.882 (95%CI, 0.820-0.929) and 0.862 (95%CI, 0.797-0.913), respectively. The cut-off values of distance from distal edge of the tumor to ARR and AV were 3.7cm and 6.7cm respectively, and the cut-off values about AV of colonoscopy and DRE were 4.0 cm and 4.0 cm, respectively. With respect to the distance predicting of sphincter preservation possibility measured by MRI, The cut-off values in male were 3.7cm(ARR) and 6.7cm(AV), and cut-off values in female were 2.5cm(ARR) and 5.9cm(AV), respectively.

Conclusions/Discussion: MRI is superior to colonoscopy and DRE, and ARR is recommended as a reference for measurement. The sphincter preservation distance of males is about 1cm higher than females.



AN UP-TO-DATE PREDICTIVE MODEL FOR RECTAL CANCER REFLECTING TUMOR BIOLOGY AND CLINICAL FACTORS.

P458

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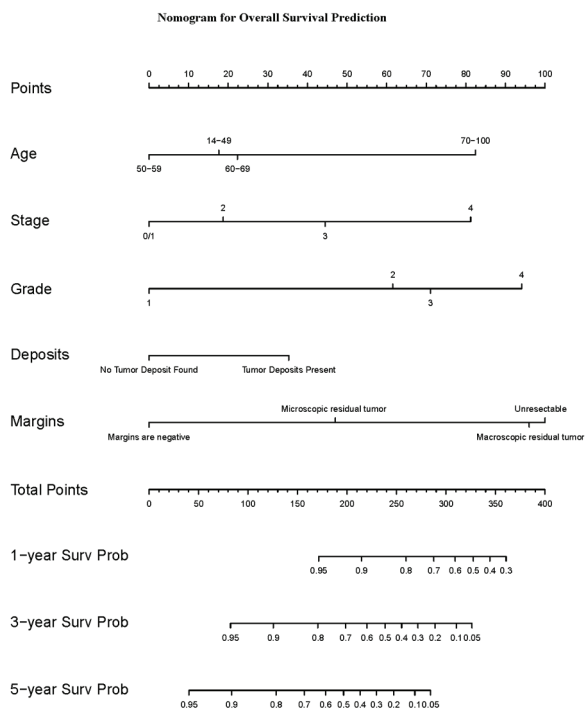
Purpose/Background: Estimates of recurrence and overall survival are integral to rectal cancer patient care, and form the basis of cancer staging and treatment planning, and managing and setting expectations for the patient. The gold standard for rectal cancer staging is the TNM system which is constrained by its inability to

incorporate the variability in clinicopathologic features and tumor biology within each stage. The aim of this study was to develop a nomogram predicting the overall and recurrence free survival for patients diagnosed with primary rectal adenocarcinoma. Such a model should be generalizable to all the cohort of rectal cancer patients, and would need to be simple, while reflecting the complex multiple factors affecting oncological outcomes including the newly characterized histopathological features associated with poor prognosis.

Methods/Interventions: An institutional database of 1688 patients with rectal adenocarcinoma was used to develop a nomogram to estimate recurrence and overall survival. Patients enrolled between the year of 2007 to 2017 were included. Prognostic factors were assessed with multivariable analysis using Cox regression, whereas nonlinear continuous variables were modeled with cubic splines. Important known predictive factors like TNM clinical and pathological staging, curative and palliative resection, mesorectal quality, neoadjuvant chemoradiation (nCRT) and adjuvant chemotherapy, tumor margins, distance from anal verge, MSI status, KRAS mutations, histopathological features such as lymphovascular invasion, differentiation grade, perineural invasion, AJCC tumor regression grade after nCRT, tumor deposits, and various pathological subtypes of adenocarcinomas were included. The impact of each of these factors was assessed individually using Kaplan Meier survival curves, and the interactions between each was also assessed in the overall model. I

Results/Outcome(s): A total of 1688 patients (male: 61%) with a mean age of 59.8 ± 13.5 years were included with a median follow-up of 2.9 years (Range 1 – 11). The tumor height was more than 1 cm above the anal verge in 72.5% of the cohort. 39% of the patients received nCRT of which 27.7% achieved a pathological complete response. Cox proportional hazards models were constructed for overall survival and recurrence-free survival. The only statistically significant factors affecting the model were age at the time of diagnosis, pathological staging, differentiation grade, and resection margin. The overall survival and recurrence free models concordance index were 0.79 and 0.74 respectively. Internal validation with 200 bootstrap samples yielded shrinkage coefficients of 0.93 and 0.81, and Somer's D of 0.56 and 0.38, for overall survival and recurrence free survival, respectively, indicating good model calibration and discrimination.

Conclusions/Discussion: The current prognostic models incorporate histopathological and clinical factors to predict overall and recurrence free survival. In consistency with the modification of AJCC TNM classification, this model emphasizes the importance of tumor deposits and other variables to generate prognosis based on a broader set of variables.



Nomogram for Overall Survival Prediction

THE CLINICAL CHALLENGE OF IDENTIFYING PRECANCEROUS LESIONS IN THE YOUNG ADULT POPULATION: A RETROSEPTIVE STUDY.

P459

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Purpose/Background: The incidence of colon and rectal cancer in young adults (defined as less than 50 years of age) has steadily increased in the last few years. Epidemiological studies have shown an increase of $\sim 1.5\%$ in this patient population. This is in contrast to the overall decreasing trend in the incidence of colon and rectal cancer in patients greater than 50 years of age, as screening guidelines in this subgroup prevent cancer occurrences through the detection and removal of precancerous polyps. When colon and rectal cancer is identified in young adults, it is often at advanced stages. This is due to a delay between the time of their symptoms and when a diagnosis is made. This is in sharp contrast to young adults at high risk for developing colon and rectal cancer, such as those with inflammatory bowel disease or polyposis syndrome, where early and frequent screenings have been shown to reduce mortality. For young adults without genetic predisposition to colon and rectal cancer, it is imperative to consider this disease process in the differential to prevent delay in diagnosis. The question then becomes, for young adults without these genetic predispositions, what are the presenting signs and symptoms that can lead to an effective screening process?

Methods/Interventions: We conducted a retrospective chart review of patients under the age of 50 who underwent a screening colonoscopy at our institution over a five-year

period. A cohort of 50 patients, who underwent a screening colonoscopy with normal findings, served as our control group. Another cohort of 50 patients, who underwent a screening colonoscopy resulting in an intervention (biopsy or polypectomy), served as our experimental group. We then compared these two groups for the following presenting signs and symptoms: age, sex, BMI, smoking, rectal bleeding, family history, rectal pain, change in bowel habit, diarrhea, constipation, and weight loss. Patients with high-risk features for developing colon or rectal cancer were excluded from the dataset. Independent samples t-tests were run to compare the treatment group on continuous variables. When assumptions were violated, Mann-Whitney U tests were used. A chi-square statistics was used to compare the treatment groups on categorical outcomes. Stepwise logistic regression was then used to see which combination of variables might predict for being an experimental. All analysis were conducted using SPSS Version 25.

Results/Outcome(s): Of the 100 patients who underwent a screening colonoscopy, 55% were female. Having a family history and rectal bleeding were the two most common reasons to undergo the procedure. When a polyp or mass was identified in the experimental group, the majority were in the left colon (36%), followed by rectum (27%), transverse colon (20%), and right colon (17%). Only one case of adenocarcinoma was identified on screening, while the majority of the polyps were either adenoma or of hyperplastic histology. There were non-significant differences between the experimental and control groups for age ($p=0.11$) and for BMI ($p=0.39$). Chi-square test found no statistically significant differences between the treatment group for any potential outcome: gender ($p=0.16$), smoking ($p=0.18$), bleeding ($p=0.69$), family history ($p=0.32$), pain ($p=0.4$), change in bowel habit ($p=0.32$), diarrhea ($p=0.62$), constipation ($p=1$), and weight loss ($p=1$). Frequency and percentages for these findings can be found in Table 1.

Conclusions/Discussion: Previous studies that characterize clinical features in young patients with colon or rectal cancer have shown that hematochezia and chronic abdominal pain were the two most common presenting signs. Specifically, Dozois et al. showed that young adults were symptomatic at presentation, had left-sided lesions, and were diagnosed with advanced disease. Their study was a large retrospective review of young adults diagnosed with colon and rectal cancer. In contrast, our study looked mainly at those with precancerous lesions. This study is a retrospective review of young adults who underwent a screening colonoscopy for a variety of signs and symptoms. We compared a control group of patients who underwent screening with normal findings to an experimental group of patients who underwent screening resulting in an intervention. Comparison of these signs and symptoms were not statistically significant. As such, identification of precancerous lesions in the young adult population without genetic risk factors but with symptoms remains clinically challenging.

THE INFLUENCE OF CHEMOSENSITIVITY FOR 5-FLUOROURACIL AFTER PREOPERATIVE CHEMORADIO THERAPY IN PATIENTS WITH LOCALLY ADVANCED RECTAL CANCER USING IN VITRO ADENOSINE TRIPHOSPHATE-BASED CHEMOTHERAPY RESPONSE ASSAY.

P460

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Purpose/Background: Preoperative concurrent chemoradiotherapy (CRT) is considered as a standard treatment to treat locally advanced mid or low rectal cancer. The treatment responses after preoperative CRT are assessed by tumor regression grades, which are affected by the status of residual tumor with fibrotic changes. Most previous studies focused the effectiveness of radiotherapy for primary rectal cancer after preoperative CRT. However, we postulated that treatment response after preoperative CRT can be affected by the chemosensitivity of patients with rectal cancer if there is the heterogeneity of tumor response to chemotherapy using 5-fluorouracil (5-FU). The adenosine triphosphate-based chemotherapy response assay (ATP-CRA) is a developed tool to evaluate tumor cell viability by measuring intracellular ATP levels of drug-exposed cells and an untreated control. Therefore, in this study, we aimed to evaluate the influence of chemosensitivity of 5-FU after preoperative CRT for locally advanced rectal cancer using ATP-CRA.

Methods/Interventions: Between March 2008 and July 2018, the ATP-CRA for 5-FU was tested in a total of 90 patients who diagnosed rectal cancer with cT3–4 and/or positive lymph nodes and underwent rectal surgeries combined with preoperative CRT in our institution. All patients received long-course CRT, which consisted in 50.4Gy with 28 fractions for total radiotherapy dose with concurrent 5-FU chemotherapy. Patients who underwent Hartmann procedure or abdominoperineal resection were excluded. We calculated the cell death rate (CDR) by measuring intracellular ATP levels of 5-FU exposed cells and untreated controls. We divided two groups according

to the mean values of CDR: Group 1 (<the mean CDR, n=53) and Group 2 (≥the mean CDR, n=37). P values less than 0.05 was considered statistically significant.

Results/Outcome(s): There were 57 males (63.3%) and 33 females (36.7%). The mean age was 56.5±10.6 years. Tumor location from anal verge was 5.8±2.8cm. The rate of moderate differentiated adenocarcinoma was 72.2%. The mean tumor size was 2.7±1.9cm: group 1, 2.6±1.8cm and group2, 2.8±2.2cm (p=0.777). The mean CDR was 36.14±15.06 (mean±SD, range 0-77). In the group 1, tumor regression grade (TRG) was 17.0% of grade 1, 18.9% of grade 2, 43.4% of grade 3, and 20.8% of grade 4. TRG of group 2 was 10.8% of grade 1, 18.9% of grade 2, 40.5% of grade 3, 29.7% of grade 4. There was no significant difference between two groups for TRG (p=0.721). In addition, the rate of pCR in this study was 10.0%. The pCR rate of group 1 was 11.3%, whereas group 2 was 8.1% (p=0.732).

Conclusions/Discussion: According to the analysis from ATP-CRA, there was no significant correlation between chemosensitivity for 5-FU and tumor regression after preoperative CRT in patients with locally advanced rectal cancer. These results can suggest that the response rate of radiotherapy can be more important than the chemosensitivity of 5-FU during preoperative CRT for rectal cancer.

IMPACT OF EGFR AMPLIFICATION AND KRAS, NRAS MUTATION ACCORDING TO STAGE IN NORTHEAST ASIAN COLORECTAL CANCER PATIENTS.

P461

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Purpose/Background: Molecular biomarkers play very important role in the diagnosis and treatment of colorectal cancer. The epidermal growth factor receptor (EGFR) is closely related to tumorigenesis and tumor progression of colorectal cancer (CRC). KRAS serves as a mediator

P459 Table 1: Descriptive Statistics for Control vs Experimental Group Comparison

Signs and Symptoms	Control	Experimental	p-value
Age	46 (6)	44.5 (8)	0.11
BMI	29 (7)	30 (5)	0.39
Gender (male)	19 (38%)	26 (52%)	0.16
Smoking	6 (12%)	11 (22%)	0.18
Bleeding	22 (40%)	20 (40%)	0.69
Family History	30 (60%)	25 (50%)	0.32
Pain	6 (12%)	9 (18%)	0.4
Change in Bowel Habit	7 (14%)	3 (6%)	0.32
Diarrhea	3 (6%)	1 (2%)	0.62
Constipation	5 (10%)	4 (8%)	1
Weight Loss	1 (2%)	1 (2%)	1

between extracellular ligand binding and intracellular transduction of signals from the EGFR to the nucleus. The aim of this study was to determine the relationship with EGFR, KRAS and NRAS status according to stage.

Methods/Interventions: We retrospectively analyzed the clinicopathologic features, and the status of EGFR amplification, KRAS mutation, NRAS mutation in 249 colorectal cancer patients who received colorectal resection between 2015 and 2018 in Yeouido St. Mary's Hospital, South Korea.

Results/Outcome(s): EGFR status showed significant association with stage, ($p=0.015$) but no association with other factors including age, sex, KRAS and NRAS status. EGFR negative status tend to be more in stage 3 compared to other stages. KRAS, NRAS status did not showed any significant association.

Conclusions/Discussion: The patients with stage 3 CRC have high probability of EGFR negative status in Northeast Asia. Further research for the altering mechanism of EGFR amplification according to stage is needed.

LAPAROSCOPIC-ASSISTED SYNCHRONOUS BOWEL RESECTION FOR TWO SYNCHRONOUS PRIMARY COLORECTAL CANCER DETECTED BY 18F-FDG PET MRI.

P462

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Purpose/Background: It has been reported that the prevalence of synchronous colorectal cancer is approximately 3.5% of all colorectal cancers. Previous randomized trials of colorectal cancer excluded synchronous colorectal cancer because of the complexity of double resection and synchronous bowel anastomosis. Here we report two cases of synchronous colorectal cancer, which were detected by PET MRI because of the partial obstruction caused by rectal cancer prevented the passage of colonoscopy.

Methods/Interventions: Two patients with synchronous colorectal cancer detected by PET MRI received laparoscopic-assisted bowel resection and synchronous anastomosis in Department of General Surgery at the Chinese People's Liberation Army General Hospital. Surgical specimens were routinely examined by HE staining.

Results/Outcome(s): Both patients were male. Tumor locations of patients were rectum and ascending colon. PET MRI staging of index cancers of rectum were T2N0M0, T3N0M0 and second cancers of ascending colon were T2N0M0 and T2N1M0. Both patients received right colectomy and anterior resection. Pathological staging of index cancers of rectum were T2N0M0, T3N0M0 and second cancers of ascending colon were T2N0M0 and T2N1M0. Multiple tubular adenomas were found in both patients. There were no postoperative complications.

Conclusions/Discussion: Laparoscopic-assisted bowel resection and synchronous anastomosis for synchronous colorectal cancer patients are safe. Comprehensive preoperative examinations are necessary, especially for patients with partial obstruction caused by rectal cancer.

A SECOND OPINION FOR INCOMPLETE T1 COLORECTAL CANCER PATHOLOGY REPORTS RESULTS IN FREQUENT CHANGES TO TUMOR RISK CATEGORY.

P463

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Purpose/Background: When malignant polyps (T1N0M0) are found on colonoscopy, there are typically 3 treatment options: radical oncologic resection, repeat endoscopic therapy, and surveillance. Several histopathological features should prompt consideration of radical resection, including tumor budding, high histological grade, positive margin, lymphovascular invasion (LVI), and depth of invasion. Depth of invasion is often measured by sm level or absolute depth in um. The College of American Pathologists (CAP) has published guidelines for T1 colorectal cancer pathology reports which list features that are "mandatory" and "optional" to be included. With the exception of tumor budding and depth of invasion, all of the high-risk features are included in these guidelines. Nevertheless, pathology reports often do not mention all of these high-risk features. Incomplete reports may result in inaccurate tumor risk stratification. This can result in patients being under or overtreated, especially if a second pathologist's opinion or an addendum is not requested. The aim of our study was to perform a population-based assessment of pathology reporting for T1 colorectal cancers and determine how often second opinions or addendums were requested, and how often the second opinion changed the way in which the tumor was categorized (high vs. low risk).

Methods/Interventions: This is a retrospective cohort study of all endoscopically resected T1 colorectal cancers in Alberta, Canada during 2016. All eligible patients aged 18 or older were identified using the Alberta Cancer Board database (ACB). Non-residents and patients with familial colorectal cancer conditions or IBD were excluded. We manually reviewed the pathology reports to determine if the tumors were high or low risk. Tumors were considered high risk if they had any of the following: high grade tumor budding, high histological grade, positive margin, LVI, sm3 invasive depth, invasive width >4000um, or invasive depth >2000um. We identified all reports that had reviews, 2nd opinions, and addendums, to determine how often the risk class of the tumor changed.

Results/Outcome(s): Three hundred eighty-eight T1 tumors were identified. After applying our exclusion criteria and removing duplicates, patients with no data,

and incidental tumors found in appendectomy specimens, we included 143 endoscopically resected T1 malignant polyps for analysis. Twenty-one (14.7%) of the reports included all of the mandatory reporting characteristics, and 15 (10.5%) of the reports included all of the mandatory and all of the optional reporting characteristics. Only 14 of the 143 pathology reports (9.8%) underwent reviews or addendums, 13 of which were incomplete reports. After the second or amended report, 9 (64.3%) tumors remained in the same category (3 high-risk, 6 low-risk), and 5 (35.7%) switched categories. One high-risk tumor was downgraded to low-risk, and 4 tumors were upgraded from low to high risk. The high-risk tumor was downgraded because tumor budding was not present. Of the 4 tumors that were upgraded to high risk, the reason for upgrade was: positive margin (1), positive for LVI (1), high-grade histology (1), and tumor invasion depth >2000um (1).

Conclusions/Discussion: Our results highlight two striking findings. First, many clinical decisions are being made for patients with T1 colorectal cancers with incomplete information. Second, when additional information is pursued, tumor risk profile changes occurred in more than 1/3 of cases. From a surgeon's perspective, these findings highlight the importance of requesting additional information and/or a 2nd opinion when managing patients with incomplete pathology reports, as this information may very well change management. In conclusion, pathologic reporting of endoscopically resected T1 malignant polyps is frequently inadequate to make informed surgical decisions. Additional educational strategies are required to ensure that these tumors are properly assessed and reported. Ensuring that these tumors get appropriately reported is critical.

IMPACT OF OBESITY ON COLORECTAL ADENOMA DETECTION RATE (ADR).

P464

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Purpose/Background: Colorectal cancer in individuals over the age of 50 has decreased in part due to screening guidelines and endoscopic adenoma removal. Recent data has demonstrated an increase in colorectal cancer in individuals under the age of 50. Presence of premalignant lesions have been correlated with proinflammatory markers. Obesity induces an inflammatory state with known adverse clinical effects including insulin resistance, diabetes, and atherosclerosis. We hypothesize that obese individuals under 50 have an increased prevalence of colorectal adenomas.

Methods/Interventions: This is a retrospective chart review of all colonoscopies performed on patients under the age of 50 by our institution's colorectal surgeons and

gastroenterologists in 2016. 1109 patients underwent colonoscopy in 2016. Excluded from the study were individuals with a personal history of colorectal adenoma or cancer, personal history of inflammatory bowel disease, a first degree relative with history of colorectal adenoma or cancer, emergent colonoscopy or colonoscopy performed as an in-patient, and personal history of colon resection. This resulted in 815 average risk patients who underwent outpatient colonoscopy due to symptoms. The most common symptoms were change in bowel habits, blood in stool, abdominal pain, and anemia. Data collection included patient age and BMI; presence, number, and location of adenoma; and high vs low risk adenoma. BMI was stratified into three classes as outlined by the Centers for Disease Control: Obesity Class 1, 2, and 3 represent BMI ranges 30-34.9, 35-39.9, and >40, respectively. High risk adenomas were defined as ≥ 3 adenomas, any adenoma >1cm in size, or villous pathology. Logistic regression analysis was used to detect the relationship between obesity (independent variable) and adenoma detection rate (dependent variable). Wald test was used to identify statistically significant independent variables (BMI classification). A binomial logistic regression was performed to ascertain the effects of BMI group on the likelihood that participants would have an adenoma.

Results/Outcome(s): The ADR for the entire study population was 23.8%, similar to the ASGE ADR benchmark for patients over 50. Patients with Class 3 obesity had a statistically significantly higher ADR compared to all other groups ($p < 0.05$). The odds ratio of increased ADR from Class 3 Obesity (BMI >40) compared to normal BMI (<25) was 1.9 [CI 1.2-3.3]. The rate of having ≥ 3 adenomas was higher in the obese population (17.9%) than in the non-obese population (6.81%). The highest percentage of ≥ 3 adenomas detected in sub-group analysis was seen in Class 1 Obesity (BMI 30-34.9) at 26.2% and Class 3 Obesity (BMI >40) at 17.1%. Normal weight individuals had ≥ 3 adenomas in 9.3% of colonoscopies detecting adenomas. The percentage of high risk adenomas were highest in Class 1 and Class 3 Obesity, 38.1% and 36.6% respectively, compared to 25.6% in normal BMI patients.

Conclusions/Discussion: In this study, adenoma detection rate was significantly increased in patients with BMI >40, who had approximately two times the odds of identification of an adenoma on diagnostic colonoscopy compared to other categories of BMI. Since incidence of colorectal cancer has increased among individuals younger than 50 years, it will be important to identify populations at increased risk of developing premalignant lesions, in an effort to minimize cost and risk. Awareness of a potential relationship between BMI and early onset colorectal cancer may provide support for preventative measures to help reduce obesity related morbidity.

IS ESD ONCOLOGICALLY SAFE? RESULTS OF A 7-YEAR ESD EXPERIENCE.

P465

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Purpose/Background: Endoscopic submucosal dissection (ESD) has emerged as a technique to remove complex colonic polyps and may even be definitive for low risk colon cancers. The advantage over endoscopic mucosal resection (EMR) is the ability to achieve en bloc resection which is associated with lower recurrence rates and more complete pathologic assessment. These advantages come with higher procedural risks including bleeding and perforation. Intraoperative perforation of colon cancers has been associated with worse oncologic outcomes including higher local recurrence rates. Major concerns remain regarding potential adverse oncologic outcomes when ESD is performed on colon cancers. It is unclear whether initial ESD resection followed by segmental resection has an adverse effect on the surgical and oncologic outcomes.

Methods/Interventions: ESD has been performed at our institution since 2011. None of the patients had confirmed invasive disease prior to ESD. All cases have been collected in a prospectively maintained database. The database was reviewed to determine which patients had invasive disease on their final pathology. Data included whether the patient went on to have surgical resection, TNM stage, duration of follow up, subsequent colonoscopy findings and disease recurrence. The primary outcome of interest was disease free survival.

Results/Outcome(s): Out of a total of 283 cases, 16 patients had invasive disease after ESD. In all of these cases, segmental resection was indicated due to high risk pathological features. Two patients did not undergo surgery due to comorbidities. The remaining 14 patients underwent surgery. One patient was lost to follow up. Of the 13 patients with follow up data available, all underwent minimally invasive resection. Two of these cases were done at the time of initial ESD attempt, while the remaining cases were done electively. Five patients underwent right hemicolectomy, one left hemicolectomy, four sigmoid resection, two low anterior resection and one total

abdominal colectomy. No perioperative complications occurred. The final pathology was stage I in ten cases, stage II in one case, and stage III in two cases. Of note, there were four patients who did not have any residual disease on their final resection. There were no cases of disease recurrence for the duration of follow up.

Conclusions/Discussion: Our data suggest that ESD is oncologically safe, even when subsequent segmental resection is required.

HIPEC: IMPACT OF COMORBIDITIES ON POST-OPERATIVE COMPLICATIONS.

P466

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Purpose/Background: Hyperthermic intraperitoneal chemotherapy (HIPEC) is a treatment modality with the potential to increase survival for patients with peritoneal surface malignancies. With a high perioperative morbidity and mortality rate, there is a pressing need to better understand the impact of patients' comorbidities on postoperative complications. This study aim to report and evaluate such relationship in HIPEC patients treated in our cancer center.

Methods/Interventions: We conducted a retrospective database review in our tertiary care cancer center, and patients who underwent HIPEC between 2012 and 2018 were included. Clinical and demographic data were collected. Complications were used as endpoints and compiled using the Clavien-Dindo Classification System. We used Fisher's exact tests to investigate complication rates and Wilcoxon rank sum tests to investigate complication severity.

Results/Outcome(s): Of the 18 patients who underwent HIPEC, 56% experienced a complication (30% grade I, 30% grade II, 30% grade III, 10% grade IV), and 6% had more than one complication. We had no perioperative mortalities. Obesity (BMI > 30.0) was seen in 28% of our cohort, and 100% of obese patients had complications (40% III, 20% IV), compared to 38.5% in the non-obese patients (20% III) ($p=0.036$). A smoking history was seen in 39% of patients, and of the 4 patients that had grade 3

P464 BMI versus Adenoma Detection Rate

		BMI Group				
		Normal (BMI <25)	Overweight (BMI 25-29.9)	Class 1 (BMI 30-34.9)	Class 2 (BMI 35-39.9)	Class 3 (BMI >40)
Quantity of Adenomas Detected	0	143	188	130	90	70
	1-2	39	43	31	22	34
	≥3	4	2	11	1	7
# of Patients with Adenomas Found (%)		43 (23.1%)	45 (19.3%)	42 (24.4%)	23 (20.4%)	41 (36.9%)
High Risk Adenomas (%)		25.6%	17.8%	38.1%	17.4%	36.6%

or 4 complications, all occurred among smokers ($p=0.04$). Cardiovascular disease (CVD) was seen in 33.3% of patients and complications were seen in 50% of the CVD patients, compared to 58.33% in patients without CVD ($p=0.563$). Interestingly, older patients did not experience more complications. Patients > 60 years had a complication rate of 40%, compared to 62% for those < 60 ($p=0.382$).

Conclusions/Discussion: In our cohort, obesity was associated with an overall increased rate of postoperative complications, and smoking was associated with an increased severity in postoperative complications. CVD and age were not associated with an increased rate of complications. These findings will be further explored in larger studies.

LONG-TERM VOIDING AND SEXUAL FUNCTION IN YOUNG MALE PATIENTS AFTER ROBOT-ASSISTED TME FOR RECTAL CANCER: A CROSS-SECTIONAL STUDY.

P467

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Purpose/Background: Voiding and sexual function are recognized complications after total mesorectal excision (TME) for rectal cancer. Robotic surgery has the advantage that could identify and preserve the autonomic nerves compared to open and laparoscopic surgery. Several cohort studies showed a tendency toward less deterioration and quicker recovery in robotic TME. However previous studies included all patients who underwent robot surgery regardless of age and sex which could be severe confounder to evaluate the functional outcome. Moreover the results up to one year after operation were only reported. This study aimed to assess the voiding and sexual function following robotic TME. In particular, we focused long-term results in sexually active male patients by the single experienced surgeon to eliminate the confusion of previous studies.

Methods/Interventions: In this cross-sectional study, we surveyed male patients aged under 50 years at operation who underwent robotic rectal cancer surgery between November 2011 and July 2018. Patients with death and recurrence were excluded to minimize the influence of psychological effects. Receiving questionnaires either directly or by phone. Surveys were International prostate symptom score (IPSS) for voiding function and 5-item version of the international index of erectile function (IIEF-5) for sexual function. A single question was added to the questionnaire, which was a personal feel for functional change after surgery. Surgical data were collected from hospital records. Possible predictors of postoperative voiding and sexual function were tested on univariate analyses by the Student's t-test and one-way analysis of variance (one way ANOVA) for continuous data and

chi-square test for categorical data. All statistical analyses were conducted using SPSS version 23.

Results/Outcome(s): Sixty-nine patients were eligible for inclusion criteria. Among them, a total of 34 (49.3%) questionnaires were included in this study. The present mean age was 44.9 and age at operation was 41.4. The location of the tumor was the upper 3 (8.8%), middle 12 (35.3%), and low 19 (55.9%). Twenty-three patients (67.6%) received preoperative chemo-radiation therapy. All patients underwent sphincter saving surgery. Twenty-two patients (64.7%) underwent low anterior resection (LAR) with stapled anastomosis. Twelve patients (35.3%) underwent ultra LAR or inter-sphincteric resection (ISR) with hand-sewn colo-anal anastomosis. Mean operative time was 323.9 minutes. No conversions occurred. The diversion was performed in 24 patients (70.6%). Five patients (20.8%) could not undergo stoma reversal. The mean IPSS and IIEF-5 scores were 6.1, 15.7. Twelve patients (35.3%) and 11 patients (32.4%) had voiding and sexual dysfunction according to the score. However, the answer for a personal feel was better. 8 patients (23.5%) and nine patients (26.5%) responded that there was a moderate-to-severe decrease in voiding and sexual function after the surgery. The severe decline in sexual function was more common than voiding function. Eight patients (23.5%) responded that they had a severe decrease in sexual dysfunction, but only two patients (5.9%) answered that they had severe voiding function. Mean post-operative day defined from the date of surgery to the day of the survey date was 41.6 months. There were three patients within one year after surgery, and 9, 3, 5, and five patients were distributed every year. There were nine patients above five years after surgery. No correlation was found between the postoperative period and functional outcomes. In univariate analysis, patients with ileostomy showed lower sexual function ($P=0.029$). Age at operation ≤ 40 ($P=0.252$), pre-operative chemo-radiation ($P=0.271$), ultra LAR and ISR with colo-anal anastomosis ($P=0.138$), and postoperative chemotherapy ($P=0.271$) were associated with the poor sexual function. In the patients with age under 40 at operation ($n=12$), only two patients (16.7%) had sexual dysfunction by the IIEF-5 score. Only one of the two patients had a moderate-to-severe decrease compared to the preoperative status.

Conclusions/Discussion: Based on our results voiding and sexual dysfunction were 35.3% and 32.4% in young male patients by the single experienced surgeon, respectively. A personal feeling was better than dysfunction rate by questionnaire. This result was comparable or better than previous studies. Because we only included the patients aged under 50 and the autonomic nerve-preserving surgery was performed well by the single experienced surgeon. Moreover, we could identify functional outcomes after one year from surgery. Although a small number of patients were enrolled yet, our study has the strength that we showed the result of sexually active male patients and one year after surgery.

SCREENING FOR ANAL CANCER: IS PAP SMEAR AN ADEQUATE METHOD?

P468

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Purpose/Background: The squamous cell carcinoma (SCC) of the anal canal is rare, but the incidence has been increasing in the last two decades, at around 2,2% each year. This is partly due to the increase of the population infected by the human immunodeficiency virus (HIV) and their longer life expectancy, as well as the high rates of human papillomavirus (HPV) infection. The 5 year survival rate for the patients with SCC of the anal canal varies from 60-80% when diagnosed in early stages to 30% when diagnosed in advanced stages. Many studies have demonstrated that, for some high risk populations, screening for SCC is cost effective and recommended. However, there is no consensus over what technique is the most suitable for screening, with the anal Pap smear and high-resolution anoscopy (HRA) being the most frequently employed. The aim of the study was to evaluate the agreement between the results of anal Pap smear and HRA guided-biopsy.

Methods/Interventions: A retrospective analysis was made from a cohort of 632 HIV-positive patients enrolled in a screening program. They were submitted to 1331 Pap smears and HRA from 2006-2016. Immediately after the Pap smear is collected, HRA is performed and, if any abnormality is observed, a guided biopsy is made, which is considered the gold standard for the diagnosis of dysplasia. If no abnormality is observed during the HRA, a random biopsy is performed. Both the Pap smear and the biopsies were interpreted by only two pathologists specialized in HPV-related dysplasia. The agreement between the result of the cytology and the biopsy was analysed and estimated by weighted kappa. We calculated the sensitivity, specificity and positive and negative predictive values (PPV and NPV, respectively) of the Pap smear to predict any grade of dysplasia (low and high grade intraepithelial lesions – LSIL and HSIL, respectively) and also to predict high grade intraepithelial lesions.

Results/Outcome(s): Most of the patients were male (85,1%), with a mean age of 44,7 years. The mean time of HIV infection was 19 years (2-41 years), 85% of the patients had CD4>400 cells/mm and 73% had undetectable viral load. The histological results showed an incidence of 52% of dysplasia of any grade (LSIL or HSIL). The correlation between the Pap smear and the biopsies based on the presence of any grade of dysplasia showed a weighted kappa of 0,24, sensitivity of 63,2%, specificity of 61,6%, PPV 64,2% and NPV of 60,6%. The correlation between the Pap smear and the biopsies based on the presence or not of HSIL showed a weighted kappa of 0,23, sensitivity of 20,8%, specificity of 96,6%, PPV 55,5% and NPV of 85,5%.

Conclusions/Discussion: The Pap smear is not sensitive enough for the diagnosis of anal dysplasia, even though it is very specific for the diagnosis of HSIL, being a useful tool to guide the HRA. However, given its low sensitivity, it is probably not adequate as a solo screening method for SCC of the anal canal.

TRANSANAL (TATME) VERSUS LAPAROSCOPIC TME FOR MID/LOW RECTAL CANCER: ONCOLOGICAL AND OPERATIVE OUTCOMES.

P469

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Purpose/Background: The optimal operative approach in rectal cancer is still the subject of much debate. Obesity, the anatomy of the pelvis along with tumour location and size pose significant challenges in total mesorectal excision (TME) in low rectal cancer. The introduction of transanal TME (TaTME) has offered a new approach looking to overcome these challenges to increase the likelihood of a complete TME and R0 dissection low in the pelvis. TaTME was introduced in our hospital in 2015 for management of low/mid rectal tumours. Our aim was to compare the oncological and operative outcomes from our laparoscopic TME cases versus our TaTME cases for mid/low rectal cancers since 2013.

Methods/Interventions: From 2013, all consecutive patients undergoing laparoscopic or transanal TME resection for MRI defined mid and low rectal cancers were reviewed from a single institution. Cases were matched for T stage prior to comparison. The primary outcome was resection margin involvement (R1) and secondary outcomes were intra and post-operative outcomes (operative time, conversion rate, anastomotic leak, length of stay)

Results/Outcome(s): A total of 112 patients were identified. After matching for T staging this left 51 patients in each of the groups. **See table 1.** No statistical difference was seen in age, BMI or T stage between the LapTME and TaTME groups. There was a greater number of males in both groups (88% and 65% male $p = 0.005$). The tumour height was found to be lower in the TaTME group than the LapTME group (3cm vs 4.25cm, $p=0.0001$). Despite a greater number of R1 resections in the TaTME group we found no statistical difference between the groups when looking at resection margin involvement (8% vs 4%, $p=0.399$). There was also no statistical difference in the circumferential margin (CRM) or the distal resection margin (DRM) between the two groups. Abdominal conversion was performed in only 2 (4%) of the TaTME group versus 10 patients (20%) in the LapTME group. A reduced operative time was seen in the LapTME group (240 minutes (160 – 420) $p=0.04$) however when

compared to the TaTME cases performed using simultaneous abdominal/perineal dissection ('Cecil approach') then the opposite was true (180 minutes (110 – 390) $p=0.0005$). Anastomotic leak was identified in 6 patients (18%) of the TaTME group and 6 patients (13%) of the LapTME group ($p=0.504$). Median length of stay was 7 days in both groups ($p=0.142$).

Conclusions/Discussion: The introduction of transanal TME at our hospital for mid and low rectal tumours has not compromised oncological outcomes when compared to laparoscopic TME. This is despite the fact the technique is being used in lower tumours. Operatively its associated with fewer conversions and there is no difference in anastomotic leak and overall length of stay.

DIVERTING LOOP ILEOSTOMY VS. COLOSTOMY IN RESTORATIVE ANTERIOR RESECTION FOR RESECTABLE RECTAL CANCER: A SYSTEMATIC REVIEW AND META-ANALYSIS.

P470

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Purpose/Background: The aim of this systematic review and meta-analysis was to evaluate the morbidity of loop ileostomy (LI) and loop colostomy (LC) creation in restorative anterior resection for resectable rectal cancer as well as the morbidity of their reversal.

Methods/Interventions: PubMed, EMBASE, MEDLINE via Ovid, Cochrane Library were systematically searched for records published from 1980 to 2017 by three independent researchers. The primary endpoint was overall morbidity after stoma creation and reversal. Mantel-Haenszel odds ratio (OR) was used to compare categorical variables. Clinical significance was evaluated using numbers needed to treat (NNT).

Results/Outcome(s): Six studies (two randomized controlled trials and four observational studies) totaling 1,063 patients (666 LI and 397 LC) were included in the meta-analysis. Overall morbidity rate after both stoma creation and closure was 15.6% in LI vs. 20.4% in LC [OR(95%CI)=0.67 (0.29, 1.58); $p=0.36$] [NNT(95%CI)=21 (>10.4 to benefit, >2430.2 to harm)]. Morbidity rate after stoma creation was both statistically and clinically significantly lower after LI [18.2% vs. 30.6%; OR(95%CI)=0.42 (0.25, 0.70); $p=0.001$; NNT(95%CI)=9 (4.7, 29.3)]. Dehydration rate was 3.1% (8/259) in LI vs. 0% (0/168) in LC. The difference was not statistically or clinically significant [OR(95%CI)=3.00 (0.74, 12.22); $p=0.13$; NNT (95%CI) = 33 (19.2, 101.9)]. Ileus rates after stoma closure were significantly higher in LI as compared to LC [5.2% vs. 1.7%; OR(95%CI)=2.65 (1.13, 6.18); $p=0.02$].

Conclusions/Discussion: This meta-analysis found significantly decreased morbidity rates following the creation of LI at the cost of a risk for dehydration. However, the data warned against an increased risk for ileus following LI closure.

HIGHER PROPENSITY FOR NODAL METASTASES AMONG YOUNG-ONSET RECTAL CANCERS.

P471

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Purpose/Background: Rectal cancer is dramatically increasing among adults younger than age 50. Advanced-stage (III and IV) disease is over-represented among the young. We aimed to examine whether the nodal positivity rate differs between young-onset vs. later-onset cases, for a given T stage.

Methods/Interventions: Rectal and rectosigmoid adenocarcinomas clinically staged as I, II or III that underwent surgical resection between 2008 and 2012 were identified from the National Cancer Data Base. Pathologic nodal status for a given T stage was the main outcome measure. Results were stratified by age at diagnosis (<50 vs. ≥ 50 years) and by neoadjuvant therapy (standard chemotherapy, yes vs. no).

Results/Outcome(s): We identified 17,111 cases: 3,946 patients <50 and 13,165 patients ≥ 50 years. Overall, young-onset rectal cancers showed higher rates of pathologic nodal positivity for clinical T stages 1-3 (cT1 33.0% vs. 26.1%, $P=0.005$; cT2 37.5% vs. 31.5%, $P<0.005$; cT3 45.4% vs. 38.7%, $P<0.001$). Among 3,701 patients with clinical T1/2 disease who underwent proctectomy without neoadjuvant therapy, younger patients demonstrated higher pathologic nodal positivity rates (33.8% vs. 28.1%, $P<0.005$), suggesting a higher rate of inaccuracy in preoperative determination of clinically node-negative disease. Among 9,789 patients with clinical T3/4 disease who received neoadjuvant therapy prior to proctectomy, younger patients still demonstrated higher pathologic nodal positivity rates (42.4% vs. 35.2%, $P<0.001$).

Conclusions/Discussion: Young-onset rectal cancers showed higher propensity for nodal positivity for a given T stage. This difference persisted among patients treated with standard neoadjuvant therapy, suggesting a role for more intensified regimens. A higher pre-test probability for node positive disease in younger patients may help improve clinical staging, which currently serves as a key guide to treatment planning.

COMPARISON OF CT-BASED RADIOMICS SIGNATURE BETWEEN LEFT-SIDED AND RIGHT-SIDED OF STAGE III COLON CANCER.

P472

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Purpose/Background: This study aims to explore the different radiomics signature of stage III colon cancer patients based on the location of the cancer, left or right sided, and to investigate the predictive ability of radiomics signature prior to pre-operation of colon cancer.

Methods/Interventions: For this retrospective study, total of 113 (71 right and 42 left sided-colon cancer

regions) cancerous regions from a primary cohort of 102 patients with stage III CRC confirmed by pathology were included. The cancer regions were manually segmented by an expert radiologist using portal-venous phase CT scans. The tissue segmentations were evaluated by an experienced surgeon as including the pathological findings. Thirty-seven texture based radiomic features were extracted with five different approaches which utilize intensity, shape and patterns of the cancer regions. The most significant features among all the extracted features were determined using least absolute shrinkage and selection operator (LASSO) regression analysis. During the experiments, the data was split into two subsets for training and validation processes. Besides, right sided cancer

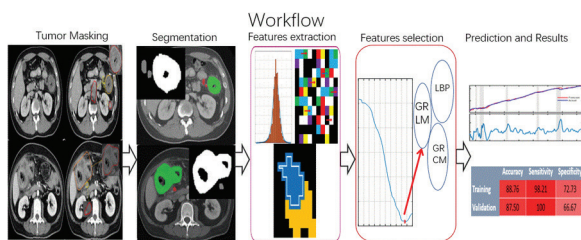
P469 Table 1: Transanal TME versus Laparoscopic TME in mid/low rectal cancer: oncological, intra and post-operative outcomes

	Laparoscopic TME		p value
	Transanal TME (TaTME) 2015 - 2018	(LapTME) 2013 - 2018	
Total Number of cases	51	51	
Age, median (range)	69 (41-88)	70 (40-89)	0.352
Sex	45, (88%)	33, (65%)	0.005
Male n, (%)	6, (12%)	18, (35%)	
Female n, (%)			
BMI, Mean +/- SD	27.62 (19.6 – 40.8)	26.59 (19.27- 36.72)	0.230
Tumour height (cm) from Anorectal junction, median	3cm (2-6)	4.25cm (3-10)	0.0001
T – stage	10 (20%)	10 (20%)	
T1	15 (29%)	11 (22%)	
T2	23 (45%)	29 (56%)	
T3	3 (6%)	1 (2%)	
T4			
Neo-adjuvant therapy	11 (22%)	5 (10%)	
CRT	3 (6%)	1 (2%)	
SCRT			
Operation type	33 (65%)	47 (92%)	
AR	18 (35%)	4 (8%)	
APE /TME Hartmanns			
Conversion rate (abdominal dissection)	4% (2)	20% (10)	0.013
Operative time, minutes – median (range)	60 (110- 480)	240 (160-420)	0.04
Cecil approach - median (range)	180 (110 – 390)		0.0005
Permanent stoma	18 (35%)	4 (8%)	
Median circumferential margin (range)	8mm (0 – 20)	10mm (0.5 – 32)	0.215
Median distal resection margin (range)	20mm (3-70)	20mm (1-80)	0.218
Median lymph node yield, (range)	20 (3-65)	20 (5-33)	0.383
Resection margin involvement	47 (92%)	49 (96%)	0.399
R0	4 (8%)	2 (4%)	
R1			
Anastomotic leak (%)	6 (18%)	6 (13%)	0.504
Median length of stay – days (range)	7 (3-18)	7 (3-28)	0.142

regions were labeled as positive and left-sided cancers as negative. Later, a binary classification model was generated using Support Vector Machine (SVM) approach. The predictive accuracy of radiomics signature was investigated using accuracy, sensitivity and specificity.

Results/Outcome(s): We determined three most significant radiomics features with LASSO regression analysis which were correlation of gray-level co-occurrence matrix, short run emphasis of run-length matrix and third pattern for of local binary pattern. The three-feature based radiomic signature was utilized to build SVM classifier model. We obtained an accuracy of 88.76%, a sensitivity of 98.21% and a specificity 72.73% for training dataset. The model successfully categorized the CRC validation data with an accuracy of 87.5%, a sensitivity of 100% and 66.67% specificity.

Conclusions/Discussion: The texture-based radiomic features successfully differentiated the stage III colon cancers located on the left and right-side of the colon. A three-feature based radiomics signature derived from portal-venous phase CT considered to be a significant predictor for discrimination of cancerous regions of stage III patients to evaluate effects of the location for patient survival which can be useful for making precise clinical decision.



STENTING AS BRIDGE TO SURGERY IN OBSTRUCTED COLORECTAL CANCERS: LONG-TERM ONCOLOGICAL OUTCOMES AND PATTERNS OF RECURRENCE.

P473

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Purpose/Background: 7-29% of colorectal cancers (CRCs) present with obstruction, where emergency surgery has been associated with significantly elevated morbidity and mortality. Self-expanding metallic stents (SEMS) can be used to relieve malignant colorectal obstruction, both palliatively and as a bridge to primary resection. The latter has perceived advantages including allowing bowel decompression and optimization before elective surgery, thereby reducing complications associated with emergency surgery, increasing primary anastomosis and reducing stoma creation rates. Although endoscopic stenting has enjoyed a high technical and clinical success rate of approximately 90%, its role as a bridge to curative surgery remains

debatable largely attributable to possibly associated worse oncological outcomes. Stent-related tumour perforations and subclinical microperforations can potentially result in tumour dissemination and seeding, hence increasing recurrence risk and negatively impacting survival. This study aims to evaluate the long-term oncological outcomes and patterns of recurrence after stenting for obstructed CRCs followed by curative resection.

Methods/Interventions: Over a 10-year period from 2007 to 2016, 114 consecutive patients who underwent SEMS placement for obstructing CRCs at Singapore General Hospital were retrospectively reviewed from a prospectively collected database. Large bowel obstruction was confirmed clinically and radiologically. Full staging computed tomography (CT) scans were done either at diagnosis or within 30 days of presentation. Excluded were cases where stenting was done for anastomotic recurrences, patients with stage IV disease at diagnosis, or those with other primary cancer(s) diagnosed within 5 years of index malignant colorectal obstruction.

Results/Outcome(s): 62 patients underwent stenting followed by curative surgical resection of the primary obstructing CRC. None had distant metastases at presentation. The median age was 70 years (range, 37-90). 87.1% of the patients were ASA 1-2 (n=54). 57 patients were successfully stented. 1 technical failure and 1 stent perforation were encountered, with both cases requiring emergency surgery on the same day. 3 other cases had minimal bowel decompression post-stenting and were operated within 48 hours. The median time to elective surgery was 10 days (range 5-23 days). Laparoscopic approach was used in 46.8% of the cases (n=29), 3 cases were converted to open surgery, and 30 cases were performed via the open approach. One patient was found to have a sealed perforation at the stented tumour site during elective surgery. The stoma formation rate was 6.5% (n=4). Median CEA was 5.8 (range 1.3-84.8 UG/L). 75.8% of the CRCs were T3 (n=47), and 22.6% were T4 (n=14). Most were moderately differentiated adenocarcinoma (n=59), while 2 tumours were well differentiated and 1 was poorly differentiated. 3 tumours (4.8%) had a mucinous component. 19.4% had at least one or more extranodal tumour deposit(s) (n=12). The overall complication rate was 21.0%. 90-day mortality was 3.2% (n=2). One patient sustained an anastomotic leak and died 12 days after surgery. One patient demised 46 days postoperatively due to pneumonia. 28 patients (45.2%) developed metastases during the time of study. Median time to recurrence was 16 months (range 3-69 months). Most of the patients had single-site metastases (n=18), where 4 patients had liver-only metastases, 4 patients had lung-only metastases, and 10 patients had peritoneum-only metastases. Six patients (21.4%) had two sites of metastases, and four patients (14.3%) had three or more sites of metastases. Peritoneum was the commonest site of recurrence (n=17), followed by liver (n=9), and lung (n=8). None of the two patients

with stent-related tumour perforations developed recurrence. Among the 17 patients with peritoneal recurrence, the median time to recurrence of 14 months did not differ significantly from the other 11 patients with non-peritoneal sites of recurrence who recurred after a median duration of 17 months ($p=0.990$). Metastasectomy was performed in 9 patients (32.1%). The median recurrence free survival was 30.5 months, while overall survival of the study cohort was 38.5 months (range 0-154 months). The 3-year overall survival was 74.3%, and 5-year overall survival was 58.8%. Subgroup analysis of patients with recurrences demonstrated superior survival among patients who underwent subsequent metastasectomies ($p=0.018$), and worse overall outcomes for patients with peritoneum-only metastases ($p=0.015$).

Conclusions/Discussion: Stenting for obstructed CRCs with no distant metastasis may offer comparable and relatively good long-term overall and disease free survival rates. In patients with recurrences, peritoneum was the commonest site of involvement (60.7%). Worse oncological outcomes were observed among patients with peritoneum-only metastases.

COMPARISON OF ABDOMINOPERINEAL RESECTION VS. SPHINCTER SAVING RESECTION FOR LOW LYING RECTAL CANCER.

P474

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Purpose/Background: The present study compared the perioperative/postoperative and oncological outcomes of abdominoperineal resections (APRs) and sphincter saving resection (SSR) for very low lying rectal cancer.

Methods/Interventions: Between January 2001 and December 2014, 176 patients who underwent SSR ($n=67$) and APRs ($n=109$) for low rectal cancers except stage IV were retrieved from a prospective database.

Results/Outcome(s): With a median follow up of 66.5 months. The performing rate of neoadjuvant chemoradiation therapy (CCRTx) was significantly higher in SSR (52.2%) vs. APR (14.7%) ($p<0.005$). Mean proximal margin was 14.1cm (SSR) vs. 20.1cm (APR) ($p<0.005$). Mean distal margin was 2.1cm (SSR) vs. 3.7cm (APR) ($p<0.005$). Mean total number of harvested lymph node was 16.7 (SSR) vs. 17.1 (APR) ($p=0.801$). T stage was not significantly different between the SSR and APR. The rate of lymph node positive rate in N stage after surgery was significantly higher in APR (45.9%) vs. SSR (25.4%) ($p<0.005$). The 5-year overall survival rates for SSR and APR were 87.3% and 67.6%, respectively ($p<0.005$). The 5-year disease free survival rate (DFS) was 83.6% (SSR) vs. 65.5% (APR) ($p<0.002$). Local recurrence rate was not different between the two groups. However, systemic

recurrence rate was significantly higher in APR (26.6% vs. 11.9%, $p=0.023$). In multivariate analysis, node positive (N1-2) is prognostic factor for DFS.

Conclusions/Discussion: Based on the present data, APRs have longer margin compared to SSR. Nevertheless, the node positive rate in N stage after surgery is higher in APR. The oncologic outcome of APR is also worse than SSR, probably due to N stage. From the N stage point of view, APR also likely to benefit from CCRTx. It seems to be good to perform CCRTx before APR.

RELATIONSHIP BETWEEN OBESITY AND EARLY ONSET OF COLORECTAL CANCER IN THE HISPANIC POPULATION: SHOULD OBESE HISPANICS HAVE AN EARLIER SCREENING COLONOSCOPY?

P475

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S. Narapureddy, A. Pena
Edinburg, TX

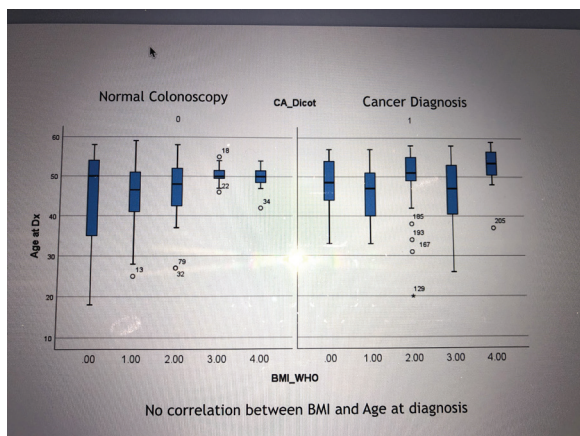
Purpose/Background: The Hispanic population, like the majority of western society, is prone to suffer from obesity. This is a modifiable risk factor for colorectal cancer. Current recommendations for cancer screening by the American Cancer Society (ACS) and the United States Preventive Service Task Force (USPSTF) are to start surveillance at age 45 and 50, respectively. The increasing incidence of obesity in the U.S. is a topic of vital importance, particularly when examining the different ethnic groups. This study examined if obesity should encourage earlier colorectal cancer screening particularly in the Hispanic population of the Rio Grande Valley.

Methods/Interventions: We designed a case-control study using a retrospective chart review of patients who underwent colonoscopy at DHR from 2010-2017. 1,521 charts were reviewed. Inclusion criteria were patients between the age 18-60 with a diagnosis of adenocarcinoma. We documented BMI, Age, Sex, and co-morbidities. We analyzed 227 Hispanic patients using descriptive statistics and logistic regression for presence of cancer (dichotomic) and association with risk factors like HTN, DM, Hyperlipidemia, Smoking status, alcohol consumption and BMI. The age and BMI were also contrasted by cancer stage using ANOVA and Gabriel for post hoc differences.

Results/Outcome(s): There was a positive correlation between BMI and likelihood of being diagnosed with colorectal cancer. More specifically patients having a BMI > 35 were 3.5 times more likely to be diagnosed with colorectal cancer (OR 3.592 95% CI: 1.181, 10.927). However, BMI and sex did not correlate with an earlier age of being diagnosed with colorectal cancer (p -value=0.225 age and p -value=0.525 sex). Interestingly in this cohort a higher BMI was also associated with a lower pathologic

stage at diagnosis. Surprisingly age also had a similar trend showing older patients having a lower stage at diagnosis.

Conclusions/Discussion: BMI continues to show a positive correlation to risk of colorectal cancer however we did not find a risk for earlier age at diagnosis. Obese Hispanic patients do have a higher risk of colorectal cancer however they are not at risk for early onset nor having a higher stage at diagnosis. Though recent studies recommend earlier screening guidelines for obese patients our data suggests such a stringent approach may be unwarranted particularly in the Hispanic population.



ROBOTIC ASSISTED TRANSANAL MINIMALLY INVASIVE SURGERY (TAMIS) WITH DA VINCI XI FOR A SUCCESSFUL REMOVAL OF A LARGE BENIGN DISTAL RECTAL POLYP.

P476

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Purpose/Background: A transanal approach to rectal polyp and cancer excision can be an appropriate treatment option to conventional rectal resection given its high morbidity and cost. In 2009, Transanal Minimally Invasive Surgery (TAMIS) was introduced as a safe transanal surgical technique as an alternative to Transanal Endoscopic Microsurgery (TEM). With emerging technology, robotic assisted TAMIS became a natural evolution of TAMIS utilizing the ergonomics of robotic instruments. Here we present a case of an older patient with a low rectal polyp who avoided undergoing radical rectal resection by having a successful robotic assisted TAMIS using a commercially available TAMIS port platform.

Methods/Interventions: Case Presentation A 73 year-old male with multiple comorbidities who was undergoing routine colonoscopy was found to have a 3 cm flat polyp located anterior distal rectum and approximately 2 cm proximal to the dentate line. This polyp was not amenable to endoscopic removal thus patient was referred to a colorectal surgeon for possible surgical resection. Patient underwent an exam under anesthesia and repeat

flexible sigmoidoscopy confirming the respectability of this polyp which was mobile and soft.

Results/Outcome(s): Once the polyp was deemed amenable to robotic TAMIS, patient was consented for the operation. A commercially available TAMIS platform (GelPOINT Path Transanal Access Platform) was used to introduce three 8 mm robotic ports. Using a monopolar scissors, a 1-cm margin was marked circumferentially around the polyp. A full thickness plane was created and the specimen was removed. This defect was closed using a 3-0 V-Lock sutures. Patient was discharged home on the same day. Final surgical pathology showed tubulovillous adenoma negative for any malignancy or high grade dysplasia. All margins were clean.

Conclusions/Discussion: Robotic TAMIS utilizing commercially available TAMIS port platform is a useful and safe technique in removing a large distal rectal polyp for potentially benign disease preventing a radical surgical resection in high surgical risk patients.

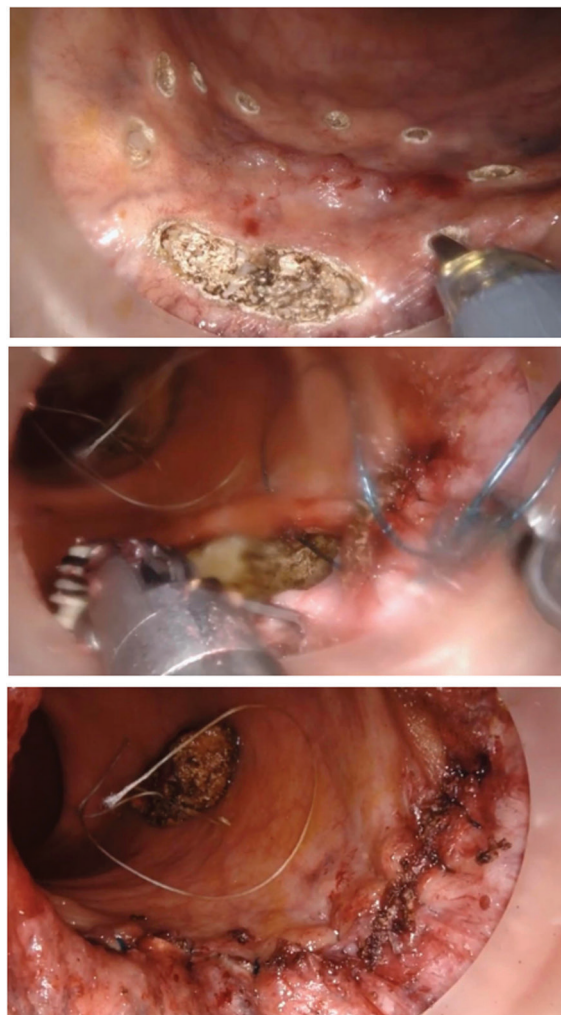


Image 1. Once TAMIS port platform was placed transanally, 1 cm margin was marked circumferentially around the 3 cm flat polyp. Full thickness specimen was removed and the defect was closed using a 3-0 V-Lock suture.

JOURNEY FOR PATIENTS FOLLOWING ILEOSTOMY CREATION IS NOT STRAIGHTFORWARD.

P477

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Singapore, Singapore

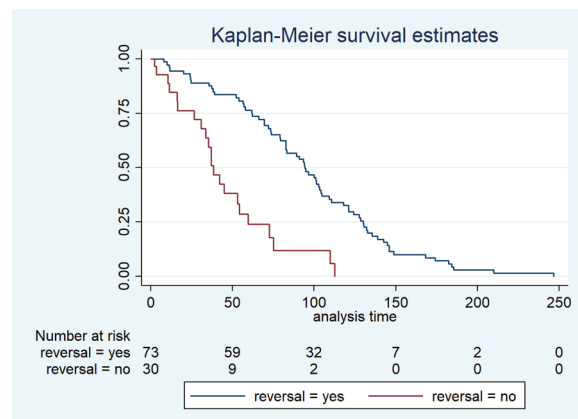
Purpose/Background: An ileostomy is usually created to avert systemic sepsis in a patient with a tenuous anastomosis. However, what is often not reported are the numerous issues facing these patients subsequently, ranging from readmissions, non-reversal of the stoma and complications from the closure. This study was performed to identify these issues amongst patients following creation of an ileostomy.

Methods/Interventions: We conducted a retrospective analysis of consecutive patients who had an ileostomy created from January 2011 to December 2016 at two institutions. Statistical analysis was performed to identify risk factors associated with for readmissions and ileostomy non-reversal.

Results/Outcome(s): In total, 193 patients had an ileostomy created during the study period. Twenty-six (13.5%) patients developed stoma related complications requiring readmission. This occurred at a median duration of 7 (interquartile range 3 – 19) weeks after ileostomy creation. The most common cause of readmission (9.3%) was due to dehydration and acute kidney injury secondary to high stoma output. One hundred and thirty (67.4%) patients had their ileostomy reversed. On multivariate analysis, only stomas created during an ultralow anterior resection were associated with reversal (OR 2.88 (95% CI, 1.24 – 6.68); $p = 0.014$). Although not statistically significant, there was a trend towards significance for permanent ileostomies in patients age >50 (OR 0.358 (95% CI, 0.120 – 1.07); $p = 0.065$) as well as in patients in whom only a stoma was created alone (OR 0.358 (95% CI, 0.124 – 1.03); $p = 0.057$). Log-rank analysis between patients who had their ileostomy reversed and those who did not showed that there was a statistically significant difference in time to death ($p < 0.0001$) (Figure 1). Among the patients who underwent ileostomy reversal, seven (3.6%) patients developed complications from their ileostomy reversal. Four patients (2.1%) suffered from an anastomotic leak which required repeat surgical intervention with one mortality from the ensuing sepsis. Two other (1.0%) patients were readmitted for bleeding while one (1.4%) patient developed a wound infection and was treated with intravenous antibiotics. Median time to ileostomy reversal was 4 (interquartile range 2 – 5) weeks after creation.

Conclusions/Discussion: Almost half of the patients who had an Ileostomy had an undesirable outcome, including readmissions, non-reversal and post-operative complications following closure. Patients need to be

properly counselled about the risks involved prior to the index operation.



RETROSPECTIVE RESEARCH MINIMALLY INVASIVE TREATMENT OF MID-LOW RECTOVAGINAL FISTULA.

P478

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Purpose/Background: The treatment of the rectovaginal fistulas (RVFs) is extremely difficult. No standard surgical procedure is accepted worldwide. The aim of this article is to probe a feasible procedure for mid-low rectovaginal fistulas procedure.

Methods/Interventions: 17 cases were studied retrospectively, who underwent rectovaginal fistulas minimally invasive surgery from Aug. 2016 to Oct. 2018. All cases were reported mid-low position (in the lower or middle one-third of the vaginal wall), and the clinical data collected from one center.

Results/Outcome(s): The median age of the patients was 49 years (range, 10-76 years), and the median BMI score was 22.65 (range, 19.8-28.1). The mean operative time was 82.5 min (range, 60-120 min), and the hospital stay after surgery was 8.8 days (range, 6-15 days). Anal approach was 11 cases and vaginal 6 cases. In anal approach, 5 cases were treated by rectal mucosal advancing flap (RMAF) with transanal endoscopic microsurgery (TEM) directly. Other 6 cases underwent RMAF procedure after TEM exploration. In vaginal approach, 4 cases were treated under TEM directly and 2 cases treated after TEM exploration. 3 cases were recurrent in anal approach. No recurrence is in vaginal approach. 7 cases (35.3%) were diverting ileostomy in all, including 4 cases (36.4%) anal approach and 3 cases (50%) vaginal. No severe complications occurred.

Conclusions/Discussion: TEM procedure to treat mid-low rectovaginal fistulas are strongly recommended, as it avoids any incision of the abdomen and perineal area. It is a safe and feasible minimally invasive technique.

IMMUNODYSFUNCTION IN THE SETTING OF FISTULA-IN-ANO: COMPARATIVE OUTCOMES OF HIV AND CROHN'S DISEASE PATIENTS.

P479

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Purpose/Background: With a reported incidence of 6-10 per 100 000, fistula-in-ano remains a significant cause of morbidity. Select groups may be at increased risk for development of fistula-in-ano and its complications. Anorectal disease is the most common cause for surgical referral in HIV positive patients, with approximately 1/3 presenting for management of perianal fistula. Similarly, population-based studies reveal incidence ranges between 11-28% among patients with Crohn's disease; while longitudinal studies demonstrate increased frequency with prolonged disease duration. The effect of immune disruption has been separately investigated in HIV and Crohn's disease populations; however, comparative outcomes for fistula-in-ano in conjunction with either disease remains to be further elucidated. The aim of this study is to compare early postoperative outcomes in the treatment of perianal fistula in adult patients with immune-related illnesses, Crohn's and HIV.

Methods/Interventions: We retrospectively reviewed both simple and complex fistula-in-ano repair by board certified colorectal surgeons from 2013 to 2017 at a single safety-net urban hospital. Treatment modalities included seton placement, simple fistulotomy and endorectal advancement flap with and without the use of fluorescence angiography. Patients were grouped based on disease status which includes healthy, HIV and Crohn's patients (grouped A, B, and C respectively). Patients with both HIV and Crohn's disease were excluded from further analysis as well as those with incomplete clinical data. Demographics, intraoperative data, and 60-day outcomes were recorded and analyzed using R.

Results/Outcome(s): Seventy-nine persons were identified that met inclusion criteria; 28 in Group A, 37 in Group B and 14 in Group C. Crohn's patients were significantly younger than healthy and HIV-positive patients (32yo, vs 46 and 36 years old, respectively). Treatment modality varied among the three groups, with the majority of Crohn's patients undergoing seton placement (73%), and the majority of HIV and healthy patients undergoing fistulotomy (66% and 74% respectively). Despite undergoing less invasive surgery, Crohn's patients had the highest complication rate compared to HIV and healthy patients (53% versus 16% and 3.7%, respectively). Interestingly, subset analysis did not reveal a correlation between CD4 count and outcomes in HIV+ patients.

Conclusions/Discussion: Patients with Crohn's disease have a significantly higher complication rate compared to HIV and healthy patients which is likely a result of their underlying immunodysfunction. Optimal control of active inflammation may reduce the gap seen between these groups.

COLOARTICULAR FISTULA: A RARE BUT POTENTIAL FATAL COMPLICATION.

P480

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Purpose/Background: Coloarticular fistula is a very rare complication, often found as case reports in literature. It is described most commonly in association with a hip joint surgery or diverticular disease of distal colon, inflammatory bowel disease, prolonged steroid use and pelvic irradiation for malignancy. It can potentially have lethal outcome of there is delay in diagnosis and treatment. We present our experience with a similar case, who despite timely treatment had fatal outcome.

Methods/Interventions: Our patient is a 66 YF with past medical history significant for Sjogren Syndrome, Rheumatoid arthritis with prior chronic use of Prednisolone for 10 years with previous history of exploratory laparotomy for colonic perforation, colostomy and subsequent reversal with prior history of bilateral hip arthroplasty. She was transferred from an outside facility with complaints of left hip pain and weakness. Imaging showed left hip periprosthetic infection. She was taken to operating room by orthopedics for hardware removal and washout.

Results/Outcome(s): During washout bubbles of air was seen to be welling from retroperitoneal area to the hip joint. General surgery was consulted intra operatively who performed exploratory laparotomy with lysis of adhesions. No coloarticular fistula could be detected, but necrotizing infection was ruled out. Following this colorectal surgery was consulted. Initial MRI of the pelvis with contrast did not demonstrate a coloarticular fistula. But a subsequent gastrograffin enema did show a sigmoideoarticular fistula to the left hip joint. Patient was taken back to OR for reexploration and possible sigmoid resection. Due to severe dense intra-abdominal adhesions, sigmoidectomy could not be performed. Patient had a distal transverse colostomy. Patient had a turbulent course in the hospital with sepsis and multisystem failure and was made comfort care per her wishes. She passed away on hospital day 14 due to sepsis and its complications.

Conclusions/Discussion: Fistula formation between colon and hip joint can be a catastrophic complication following hip surgery in patients who have associated risk factors. The morbidity and mortality can be significantly high. Prior multiple hip surgeries along with chronic steroid use probably played a role in our patient's coloarticular fistula. Our patient did not have any diverticular or inflammatory bowel disease. Our case was interesting by the fact that although there was air welling out during initial hip wash out, no fistula was detected on exploration and even pelvic MRI with contrast. But a diagnosis was clichéd with contrast enema study with gastrograffin, which is not commonly performed in this day and age of cross sectional imaging. This emphasizes the importance

of a classical study like contrast enema in diagnosing such cases. Although our patient did not have a good outcome despite prompt diagnosis and treatment. It is always good to have a high index of suspicion in patients who has risk factors for coloarticular fistula and manage them appropriately for best outcome.



LAPAROSCOPIC TREATMENT OF ENTEROLITH BOWEL OBSTRUCTION: CASE REPORT.

P481

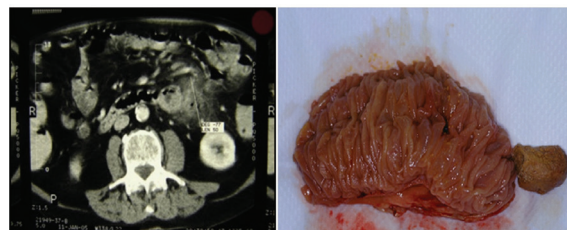
E. Delgadillo
La Chaux-de-Fonds, Switzerland

Purpose/Background: Small bowel obstruction can be caused by an entherolith formed within a jejunal diverticulum.

Methods/Interventions: We report two patients with obstructive acute abdomen caused by jejunal entherolith, demonstrated by CT-Scan, and treated by local jejunal resection and respective mechanical anastomosis by laparoscopic surgery. No evidence of fistula to the small bowel were evidenced. In both cases post-operative follow-up was uneventful. Analysis of the stones revealed the presence of calcium oxalate and bile pigments.

Results/Outcome(s): It is well accepted that diverticuli provide an acidic environment necessary for choleic acid precipitation and stone formation. However calcification cannot occur without alkaline pH shift, which normally occurs in the ileum. Our cases confirm calcification occurring in the proximal small bowel.

Conclusions/Discussion: Consensus management of enterolith ileus is to remove the stone through an enterotomy which is made in a less oedematous segment of the jejunum or by a small bowel segmentary resection done by laparoscopy.



ADOPTION OF THE SMALL BITES FASCIAL CLOSURE TECHNIQUE: A SURVEY OF CANADIAN GENERAL SURGEONS.

P482

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Purpose/Background: Incisional hernias (IH) are seen in up to 38% of patients within one year of laparotomy. IH can be a significant source of morbidity, leading to pain, poor body image and quality of life, and, in some cases, requires operative repair. In the traditional fascial closure technique, sutures are placed 10mm from the fascial edge and 10mm apart with a large needle. Two large randomized controlled trials of the small bites technique, where sutures are placed 5mm from the fascial edge and 5mm apart with a 2-0 needle, have demonstrated efficacy of this technique in reducing the rate of incisional hernias. The 2015 European Hernia Society guidelines recommend small bites for fascial closure. However, the uptake of this technique is not known. The objective of this study was to determine how frequently general surgeons are using the small bites technique and to explore the barriers to its use.

Methods/Interventions: We conducted a cross-sectional survey of university-affiliated general surgeons in Canada. The primary outcome was the proportion of respondents reporting use of the small bites technique. Secondary outcomes included awareness of the small bites technique, barriers to its uptake, and factors that surgeons believed would allow for greater adoption.

Results/Outcome(s): Two-hundred one (36.7%) of 547 invited general surgeons responded to the survey. On average, respondents estimated that 10% of their patients develop IH within 1-year of laparotomy. Although 85% of surgeons had heard of the small bites technique, only 32% of respondents reported routine use of this closure method; 28% of surgeons were using this technique for select patients with identified risk factors for incisional hernia, including previous laparotomy, emergency procedure, contaminated cases, smokers, and patients with diabetes or obesity. Among surgeons who reported routine or selective use of the small bites technique, only 19% were performing fascial closure with a 2-0 needle. Surgeons using the small bites technique estimated that this method adds, on average, an additional 6 minutes to the length of the case. Although most surgeons using the small bites technique reported awareness of the distance between bites

used in published trials, only 27% agreed/strongly agreed that they were aware of the needle size used in the trials. The most common reasons cited by all respondents for poor uptake of this method included time, habit, and a lack of awareness of the evidence for small bites. Over 70% of all surgeons surveyed agreed/strongly agreed that clinical practice guidelines incorporating small bites closure are needed.

Conclusions/Discussion: Although many surgeons have heard of the small bites fascial closure technique, few surgeons routinely use this method and in those who do, most do not adhere to the technique described in published randomized controlled trials. Perceptions that this technique significantly increases operative time and a lack of knowledge about the efficacy of this method and its adoption into European guidelines limit uptake. Greater knowledge dissemination and incorporation into North American guidelines can increase the uptake of the small bites fascial closure method, leading to a decrease in the rate of incisional hernias.

WHEN CARCINOGENIC PATHWAYS FUSE: TRADITIONAL SERRATED ADENOMAS AND FAMILIAL ADENOMATOUS POLYPOSIS.

P483

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Purpose/Background: Traditional serrated adenoma (TSA) is a rare colorectal lesion characterized by co-existing epithelial serration and adenomatous dysplasia. It is likely to arise when a clone of cells in a serrated polyp develops biallelic APC mutations. If this were the case, we would predict TSA to be common in patients with familial adenomatous polyposis (FAP). We conducted a review of our experience with TSA to test this hypothesis.

Methods/Interventions: All cases of TSA diagnosed from 2010 to 2018 were accessed from the pathology database. Retrospective chart review collected baseline demographics, presence of germline mutation, family history of colorectal cancer, prior colonoscopy results, and indication for colonoscopy. Lesion data included TSA size and location. A specialist GI pathologist reviewed the histology.

Patients with an intact colon were used to determine the location and size of TSA, with and without FAP.

Results/Outcome(s): 74 cases of TSA were identified out of thousands of polyps submitted for histology every year. 23 (31%) were from patients with FAP. The table compares demographics and epidemiologic variables between FAP and non FAP patients. Among 60 patients with an intact colon, distribution of TSAs mirrored the expected distribution of serrated polyps in this age group: 4(7%) were in the cecum/ascending colon, 2(3%) in the transverse colon, 20(33%) in the left colon, 32(53%) in the rectum. 29% of the non FAP patients had synchronous serrated polyps and 29% had synchronous adenomas. 55 of the TSA had been analyzed genetically in 2014. 42% had a KRAS mutation and 48% BRAF. 23% were CIMP high and 39% CIMP low. Most precursor lesions were hyperplastic polyps.

Conclusions/Discussion: The 74 cases of TSA are a tiny fraction of polypectomy specimens, and yet 23 (31%) were from patients with FAP. Data support the hypothesis, and suggest that TSAs occur due to loss of APC expression in a serrated polyp. The 13 year difference in age between FAP and non FAP likely reflects the time for APC to acquire its first "hit".

ANAL FISSURE- DEFINITIVE TREATMENT SUCCESS STORY WITH NO MUSCLE CUT.

P484

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Purpose/Background: Anal fissures are common and majority heal with medical therapy such as nitroglycerin ointment, calcium channel blocker oral and topical and Botox injections. More invasive methods such as anal dilation and fissurectomy have a healing rate of 84.4% and 79.8%, and an incontinence rate of 18.2 and 4.9%¹, but lateral internal sphincterotomy remains the gold standard. Sphincterotomy successfully cures fissures in more than 90% of patients, but has an incontinence rate of 10%². Finding a method that has a similarly high success rate of healing anal fissures without cutting the sphincter muscle would be highly desirable.

P483 Characteristics of TSA in patients with and without FAP

	TSA with FAP (n=23)	TSA without FAP (n=51)	p-value
Female	10(41.7%)	20(40.0%)	0.820
Age	31(+/-10)	44(+/-6)	<0.0001
BMI	26.9(+/-7.5)	29.7(+/-7.0)	0.148
Size (mm)	11(+/-9)	17(+/-15)	0.087
Smoking History	4(17.4%)	25(49.0%)	0.01
Family History	n/a	16(31.4%)	n/a
Synchronous Colorectal Cancer	0	3	n/a

Methods/Interventions: Prospective data on 330 consecutive patients, aged 20-97, who presented from 2013-2018, who failed conservative treatment of anal fissures were analyzed. Patients with inflamed hemorrhoids, superficial, complete and incomplete fistulas originating at the fissure base, dual fissures and atypical fissure were excluded. The intervention performed was an anoscopy with dilation and pudendal nerve Kenalog injection. All patients were followed up with, the following day by telephone and asked to rate their relief on a scale of 1-10. Patients then came 2 weeks later for an office visit. Following these two appointments, patients would come on an as needed basis.

Results/Outcome(s): The female to male ratio was about 3:4. Majority, 259 patients (78%) had significant relief noted the next day on the follow up interview. At the 2 week follow up appointment, all patients had complete resolution of their symptoms from the fissure. Five (1.5%) patients recurred during a time period of 3 months to 2 years and the same treatment was performed with complete healing of the fissure. Five (1.5%) patients required hemorrhoidectomy due to progression of hemorrhoidal disease. There were no patients who developed incontinence, abscess development or fistula formation after injection of Kenalog. Patients did not require opiate pain killers and recovery after the procedure did not require >3 day home stay. One patient underwent rectal advancement flap after failing the procedure.

Conclusions/Discussion: This method can be used as a last resort for treatment of anal fissures with essentially no side effects. It is well tolerated, low in cost and allows for rapid restoration of patients' lifestyles. 1. Nelson RL "Outcome of operative procedures for fissure in ano" Cochrane Database Syst Rev 2002;(1) 2. Ebinger, SM; Hardt, J; Warschkow, R; Schmied, BM; Herold, A; Post, S; Marti, L "Operative and medical treatment of chronic anal fissures-a review and network

A NOVEL APPROACH TO MEDICAL MANAGEMENT OF HIDRADENITIS SUPPURATIVA AND PILONIDAL ABSCESS FOLLOWING SURGICAL DEBRIDEMENT AND EXCISION.

P485

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Purpose/Background: Hidradenitis suppurativa (HS) and pilonidal disease (PD) are chronic inflammatory conditions of the skin caused by recurrent follicular occlusion punctuated by acute exacerbations of disease. HS can affect any intertriginous area, whereas PD most commonly affects the gluteal cleft. Although the pathogenesis is unknown, HS and PD show similar histological features and share inflammatory markers. Both can result in sinus tract and abscess formation in severe disease, requiring surgical

debridement. At present, there is no standard of care for post-operative wound management following debridement and excision of pilonidal abscesses and acute hidradenitis. We present the case of a patient with advanced HS of the groin and PD disease requiring multiple surgical interventions whose post-operative management with topical clotrimazole-betamethasone, oral metronidazole, and oral fluconazole resulted in dramatic healing (>85%) of the affected regions after 2 months.

Methods/Interventions: A 32-year-old man with a history of chronic PD presented with a draining pilonidal cyst unresponsive to antibiotics. The patient's BMI was 31.6 kg/m² and he had no other significant medical history. Anorectal exam revealed an open, purulent pilonidal cyst measuring 12 cm in diameter and surgical cystectomy was planned. Wide surgical excision and debridement of 21 x 6 x 4 cm area revealed bilateral perianal abscesses and numerous sinus tracts. Pathology results confirmed the diagnosis of ruptured pilonidal cyst and acute hidradenitis consistent with HS Hurley stage 3. Two months later, the patient returned for extensive debridement of HS. Excision and repair were performed on the following regions: right groin (11x2 cm); left groin (15x13 cm); perineum (4x4 cm); two areas on the scrotum (2x2 cm); and the right thigh (2x2 cm). Pathology confirmed the diagnosis of HS in the excised specimens. The patient received standard wound care management education and was discharged. He received prescriptions for pain control only. At his follow-up appointment two weeks following the second operation, physical exam revealed delayed wound healing of the debrided areas and a perianal rash despite patient compliance with post-operative recommendations. A new regimen of metronidazole 250 mg oral BID, fluconazole 150 mg oral daily, and topical clotrimazole-betamethasone 0.05% cream applied BID was prescribed. After two months of treatment, the patient's wounds showed dramatic improvement and he reported no side effects from the medications. An estimated 85-90% of the groin and pilonidal areas were healed.

Results/Outcome(s): After surgical intervention of pilonidal abscesses and acute hidradenitis, the use of topical clotrimazole-betamethasone, oral metronidazole, and oral fluconazole decreased the post operative wound healing course drastically. A two-month antibiotic regimen, as compared to a recently studied intervention involving a 6.2-12 month regimen of rifampicin, moxifloxacin, and metronidazole, is a significant decrease in therapy duration. This leads to decreased side effects, antibiotic resistance, duration of antibiotic therapy, further surgical intervention, cost of therapy, as well as increased patient satisfaction.

Conclusions/Discussion: It is well-established that the first-line treatment of acute PD and HS is surgical debridement and excision. Approaches to wound management following surgery, however, are varied and lack definitive evidence of clinical efficacy. Patients suffer from

complicated post-operative courses characterized by poor wound healing due to infection and chronic inflammation. Additional surgical interventions may be required, at great cost to the patient and to the health care system. Current approaches to medical treatment of Hurley stage II and III HS lesions include a 10-week course of rifampicin and oral clindamycin or a 6.2-12-month regimen of rifampicin, moxifloxacin, and metronidazole. However, long courses on these antibiotics were not well-tolerated by patients, and also increased the risk of antimicrobial resistance, particularly in the case of rifampicin. Post-operative adjunct treatment of pilonidal abscess with antibiotics has limited evidence and studies show mixed results. Systemic metronidazole, erythromycin, and clindamycin have been used following excision. A small study of 40 patients suggested that treatment with a 2-week course of metronidazole may shorten healing time, but results were statistically insignificant. Our patient's dramatic improvement after a 2-month course of fluconazole and metronidazole, in combination with topical clotrimazole-betamethasone, suggests that this treatment regimen could be highly effective in HS and PD wound healing, while also posing fewer side effects. Further investigation is needed to demonstrate its efficacy, but the success of this case offers a hopeful alternative path for patients.



MUCOSAL PROLAPSE: UNUSUAL ANORECTAL "MASS".

P486

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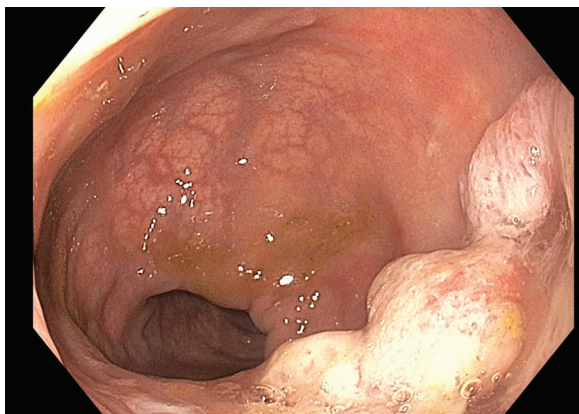
Purpose/Background: Mucosal prolapse syndrome is an amalgamation of diagnoses of which histological review shows "benign mucosal prolapse changes." It may appear as or may be misdiagnosed as an anorectal cancer or polyp.

This misdiagnosis may lead to delayed or unnecessary treatment. At a tertiary care academic institution, we see second-opinion referrals for anorectal masses, of which final pathology confirms the absence of a cancer or polyp and the benign findings of mucosal prolapse.

Methods/Interventions: Under IRB approval, two independent reviewers (co-authors) performed a retrospective case review of the principal investigator's patient database, spanning the years of 2012-2018. The search term was "prolapse". Using the institution's electronic medical record, patient demographics, clinical and pathological features, management and outcomes were assessed. All specimens with the referral of "colon or anorectal mass," of which final pathology revealed "mucosal prolapse changes" were reviewed by an attending pathologist, using the IRB-approved longitudinal Department of Pathology Database. Descriptive statistics were performed.

Results/Outcome(s): Upon review of the medical record system, 10 patients were identified who were referred for the diagnosis of colorectal neoplasm (sigmoid N = 1, 10%; anorectal N = 9, 90%); however, final pathology review showed benign mucosal prolapse changes. Seventy percent of the patients were female. Sixty percent of the patients were Caucasian, thirty percent were African American, and ten percent were Hispanic. The mean age was 52.9 (range 25-79). Thirty percent of patients reported bleeding per rectum at initial presentation and half of the patients had chronic constipation or straining. One patient was referred to our rectal cancer multidisciplinary clinic for the suspicion of rectal cancer. Three patients presented to our colorectal surgery clinic, after being told that they had a "rectal cancer." All three patients expressed their anxiety over their potential cancer diagnosis. Four patients underwent definitive excisional biopsy, confirming a pathologic diagnosis of mucosal prolapse. Two patients were ultimately diagnosed with rectal prolapse by MR defecography and had a repair of their rectal prolapse. The remainder of the patients were managed non-surgically. Final pathologic review of all specimens, by our tertiary care academic institution's pathologist, revealed mucosal prolapse changes.

Conclusions/Discussion: It is important to recognize mucosal prolapse as a potential diagnostic entity in the evaluation of an anorectal mass. Not only is the careful pathologic and clinical assessment crucial in making the diagnosis of this benign condition but also having the notion of an undiagnosed anorectal mass may cause the patient undue anxiety.



Endoscopic view of mucosal prolapse

A REAL PAIN IN THE RIGHT LOWER QUADRANT: ENDOMETRIOSIS OF THE APPENDIX PRESENTING AS RECURRENT APPENDICITIS.

P487

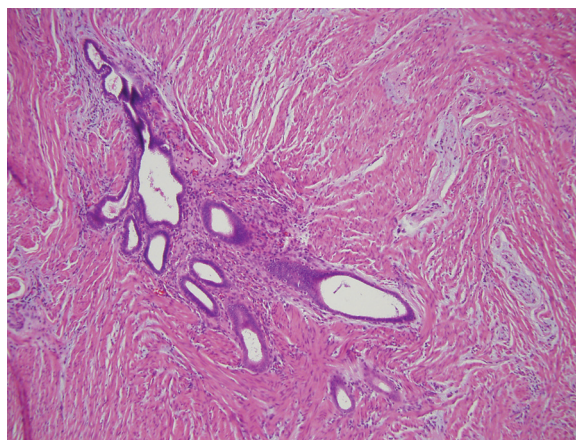
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Purpose/Background: Endometriosis is a common disorder in women of reproductive age defined by the presence of ectopic endometrial tissue found outside the uterine cavity. Appendiceal endometriosis is rare and often asymptomatic. We present a case of appendiceal endometriosis presenting as recurrent appendicitis.

Methods/Interventions: A 48 year old female with history of endometriosis and possible Crohn's disease presented for evaluation of one year history of recurrent right lower quadrant abdominal pain. A computed tomography (CT) scan of the abdomen and pelvis obtained 4 months after symptoms began was suggestive of a right lower quadrant abscess. Symptoms initially improved following percutaneous drainage and antibiotic treatment. She subsequently had between five and six further episodes of right lower quadrant pain, each of which were treated with antibiotics. A repeat CT scan was performed 5 months following the first scan and demonstrated continued inflammation in the right lower quadrant. Four months later, a colonoscopy with intubation of the terminal ileum was performed. There was no mucosal inflammation and inflammatory bowel disease was not suspected. A third CT scan was performed and demonstrated increased right lower quadrant inflammation compared to previous scan three months prior.

Results/Outcome(s): An exploratory laparoscopy with laparoscopic appendectomy was performed. There was substantial inflammation surrounding the appendix, and the appendix was scarred to the cecum. There was no gross evidence of pelvic endometriosis or appendiceal endometriosis. Pathology was significant for endometriosis involving the tip of the appendix.

Conclusions/Discussion: The prevalence of appendiceal endometriosis is thought to range between 0.4-1% in the general population, however, in patients with endometriosis, the incidence may be as high as 22%. This case report highlights the importance of consideration of endometriosis in women of reproductive age presenting with right lower quadrant abdominal pain.



Appendix pathology consistent with appendiceal endometriosis

THREE CARDINAL PRINCIPLES OF MANAGEMENT OF COMPLEX ANAL FISTULA: HAS THE MYSTERY BEEN FINALLY DECODED?

P488

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Purpose/Background: Complex Anal Fistula(CAF) is one disease which is neither fully understood nor satisfactorily managed even today. Unfortunately, the phrase by Lockhart-Mummery in 1929, "Probably more surgical reputations have been damaged by the unsuccessful treatment of a fistula", still holds largely true. But analyzing the work published in last decade, it seems that the mystery behind refractoriness of CAF to heal can perhaps be solved.

Methods/Interventions: The detailed analysis of existing procedures like fistulotomy, fistulectomy with primary sphincter repair(FPR) and advancement flap and various procedures innovated during the last decade like anal fistula plug (AFP), ligation of intersphincteric fistula tract(LIFT) and transanal opening of intersphincteric space(TROPIS)^{1, 2} helped to understand three cardinal principles which are prerequisite and are perhaps sufficient to achieve high cure rate in complex anal fistulas.

Results/Outcome(s): The three cardinal principles required for healing of CAF are- ISTAC, DRAPED and HOUTIIC **ISTAC-Inter Sphincteric Tract is like an Abscess in Closed space-** Most CAF have some

intersphincteric component and this infected tract/branch of CAF in intersphincteric space is very similar to an abscess in a closed space (between the two sphincters)³. Till intersphincteric tract/sepsis is accurately identified (by MRI/TRUS) and treated like an abscess, the chances of non-healing/recurrence would be quite high. **DRAPED- Drain All Pus and Ensure continuous Drainage** - An abscess anywhere in the body doesn't heal by antibiotics alone or aspiration of pus by needle followed by antibiotics. The abscess needs to be completely excised or drained completely along with deroofting of the cavity so that the cavity remained empty (persistent drainage is ensured). In latter case, the healing then occurs typically by secondary intention. On the similar lines, the intersphincteric tract needs to be either excised completely or thoroughly drained and the intersphincteric space needs to be kept empty till the complete healing of the intersphincteric space occurs by secondary intention. **HOUTIICS- Healing Occurs Uninterrupted Till is Interrupted Indefinitely by Collection**- Once the abscess cavity (intersphincteric space) has been deroofted, the healing would continue unabated. However, even a single episode of collection is perceived as a danger by the rapidly healing tissues which leads to stoppage of healing process followed by formation of fibrous wall. Unfortunately, this step is irreversible, Once the fibrous wall formation has initiated, then even the removal of the causing factor (drainage of the collection) doesn't help. The fibrous wall formed by the body cannot be removed by the body and the patient then needs to be operated again. **Analysis of different procedures** The procedures which take care of all these three principles have a high success rate and vice-versa. Existing procedures like advancement flap and most of the new procedures like AFP, Glue, Filac (Fistula closure by laser), VAAFT (video-assisted anal fistula closure) & OTSC focuses primarily on closure of internal opening without addressing ISTAC principle. Therefore, these procedure have success rate of 60-75%. Incidentally, on closer analysis, the majority of fistulas in most of the studies utilizing these new procedures were simple and low^{4,5}. Fistulotomy in such fistulas has cure rate upto 94-98%⁶. The success rate of these new procedures in CAF is unknown but is expected to be much lower. LIFT procedure, by opening the intersphincteric space and ligating intersphincteric tract, takes care of ISTAC principle. But it falters and fails to take care of DRAPED principle as the intersphincteric space is not kept open in the postoperative period. Therefore, LIFT has only moderate success rate (60-75%) in CAF. The only two procedures which take care of all three cardinal principles are FPR⁴ and TROPIS². FPR done correctly removes all tracts including intersphincteric tracts. Though extensive and technically demanding, it is thus akin to excision of abscess cavity for treatment of an ordinary abscess. TROPIS procedure by opening and deroofting the intersphincteric space through transanal route takes care of both ISTAC and DRAPED principles.

With regular cleaning postoperatively, HOUTIIC is also taken care of. Therefore, FPR has success rate of upto 88-95%⁷ and TROPIS has success rate of 90-95% in CAF⁸. In low fistulas, fistulotomy takes care of all these three principles as it lays open intersphincteric tract and keeps it open. Therefore, fistulotomy has much higher success rate (94-98%) than other procedures.

Conclusions/Discussion: The three cardinal principles-ISTAC, DRAPED and HOUTIIC-are logical and derived from basics principles of wound healing. These principles were completely ignored till date. The procedures which take care of these three principles are expected to have high success rate in CAF and vice-versa.

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TAILGUT CYST, REPORT OF 24 CASES SINGLE CENTER EXPERIENCE.

P489

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Purpose/Background: Tailgut cysts are rare congenital/developmental lesions that arise from vestiges of the embryological hindgut and usually present in the presacral space. This study aims to report single center experience in management of tailgut cyst.

Methods/Interventions: Retrospective analysis of 24 tailgut cyst patients treated with surgical excision in colorectal surgery department, Severance hospital South Korea, between 2007 and 2018.

Results/Outcome(s): This study included 24 patients (18 females), the median age was 51.5(21-68) years. Ten cases were symptomatic and 14 were asymptomatic. The cyst was retro-rectal in 21 cases. The cyst level was \leq coccyx level in 16 cases, opposite coccyx in 6 cases and above coccyx in other 2 cases. The cyst was supralelevator in 5 cases, of supra and infralevator extension in 18 cases and infralevator in 1 case. Ten patients were managed by anterior laparoscopic approach, 11 by posterior approach and 3 by combined approach. The mean cyst size was 5.5 ± 2.7 . Post operative complication were mainly of Clavien Dindo II. Two male patients proved to be malignant. One was neuroendocrine tumor who received radiotherapy, and one was adenocarcinoma and was closely followed up. The median follow up period was 12 (1-66) months with no recurrence.

Conclusions/Discussion: Tailgut cyst is uncommon disease, but can cause perineal or pelvic pain. Clinical examination and MRI are helpful to reach the diagnosis. Complete surgical excision is the key of treatment via appropriate approach according to tumor size, location and its relation to adjacent pelvic floor muscles.

SURGICAL MANAGEMENT OF ANAL FISTULA: RESULTS FROM AN INTERNATIONAL SURVEY.

P490

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Purpose/Background: Management of anal fistula (AF) remains controversial. The purpose of this study was to explore current surgical practice in the management of AF with a focus on technical variations among surgeons.

Methods/Interventions: An online survey was conducted by inviting all surgeons and physicians on membership directory of European Society of Coloproctology and American Society of Colon and Rectal Surgeons. An invitation was extended to others via social media also. The survey had 74 questions exploring the most current available techniques of fistula surgery, including fistulotomy, endorectal advancement anal flap (ERAF), ligation of the inter-sphincteric fistula tract (LIFT), plug insertion, glue/paste injection, laser treatment, video-assisted AF treatment (VAAFT), over-the-scope-clip (OTSC). Data were assessed using univariable analysis methods.

Results/Outcome(s): Three thousand seven hundred eight physicians were invited to take part in March 2018, of whom 13% (n=510) responded to the survey. Of these, 492 (96%) were surgeons and considered in this study. Participants were mostly colorectal surgeons (84%) at consultant level (84%), aged ≥ 40 years (64%), practicing in academic (53%) or teaching (30%) hospitals, from USA (36%) and Europe (34%). All surgeons were confident with fistulotomy, with 26% of them performing >30 procedures/year. However, 82% considered fistulotomy only for simple fistulas; 21% in both genders in any condition, 22% only in absence of external anal sphincter (EAS)

involvement in females, and 51% would never perform fistulotomy in case of EAS involvement in females with anterior fistula. The median amount of EAS sacrifice at fistulotomy was 25% (range: 16-30%) of its whole length. Fistulotomy alone was performed in 59% and 50% of simple and complex AF, respectively, while marsupialization was performed in 31% and 25%, and immediate sphincter repair in 9% and 19%, respectively. ERAF was performed by 79% of surgeons, with 66% performing ≤ 10 procedures/year, but only 2% >30 /year. 51% of surgeons considered ERAF as technically demanding. In 43% the flap included only mucosa and submucosa, in 42% was full-thickness, and in 14% ano-dermal. According to 52% of surgeons the flap was performed after only tract curettage, or after fistulectomy (34%), or associated with other procedures (12%). LIFT was performed by 72% of surgeons, with 58% performing ≤ 10 procedures/year, but only 2% >30 /year. Overall, 36% of surgeons adopted technical variations from the original procedure; 44.3% did not consider the fistula level as a limitation for LIFT, while high fistulas and low fistulas precluded LIFT according to 32% and 19% of surgeons, respectively. Only almost one-fourth of surgeons were confident with plug insertion; although the majority (24%) performed ≤ 10 procedures/year, and $<1\%$ >30 /year. Almost 90% used a seton prior to plug insertion. During the operation, tract curettage or irrigation is performed by 59% and 41% of surgeons, respectively. Less than 15% of surgeons were confident with glue/paste injection, with the majority performing ≤ 10 procedures/year, and none >30 /year. Recurrent fistulas and primary fistulas after seton placement were the main indications. 56% of surgeons used injection as an adjunct to other procedures. None of the fistula openings was closed by 19% of surgeons, while 70% closed the internal, and 12% the external opening. Only 10% of surgeons were confident with laser technique, with 8% performing ≤ 10 procedures/year, and $<1\%$ >30 /year. Recurrent fistulas and primary fistulas (with or without previous seton placement) were the main indications; 78% of surgeons closed the internal opening. Only 8% of surgeons were confident with VAAFT, with 5% performing ≤ 10 procedures/year, and $<1\%$ >30 /year. Internal opening closure (mostly by suture or ERAF) was performed by 82% of surgeons;

P489 Approach in relation to coccyx, pelvic floor, and size.

	Anterior approach (n=10)	Posterior approach (n=11)	Combined approach (n=3)
Above coccyx	0	0	2
Opposite coccyx	3	2	1
Below coccyxa	7	9	0
Supra-levatora	4	1	0
Supra+Infra levator	6	9	3
Infra-levator	0	1	0
Size (Mean \pm SD)	5.2 \pm 1.6	4.3 \pm 1.3	11.4 \pm 2.3

recurrent fistulas and primary fistulas (with or without previous seton placement) were the main indications. Finally, only 5% of surgeons were confident with OTSC, with the majority performing ≤ 10 procedures/year, and only 0.4% > 30 OTSC/year. Recurrent fistulas and primary fistulas after seton placement were the main indications.

Conclusions/Discussion: By addressing the “real life” practice for surgical management of AF, this survey surprisingly confirms that “traditional” (i.e., fistulotomy, ERAF) and “non-technological” procedures (i.e., fistulotomy, ERAF, LIFT) remain the preferred approaches. Certainly, maintenance of perfect continence may be challenging using these strategies. On the other side, the “newer and technological approaches” (i.e., plug insertion, glue/paste injection, laser, VAAFT, OTSC), even if promising better functional results, remain seldom adopted. Good quality research demonstrating superiority over the “traditional, non-technological” operations in healing fistulas is needed to widen their use.

THE IMMEDIATE SPHINCTER RECONSTRUCTION FOLLOWING A FISTULOTOMY CAN SIGNIFICANTLY DECREASE THE RISK OF CONTINENCE IMPAIRMENT IN PATIENTS AFFECTED BY ANAL FISTULA.

P491

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Purpose/Background: The immediate sphincter reconstruction after a fistulotomy has been proposed to obtain high healing rates and reduction of the risk of continence impairment. The aim of this retrospective study was to evaluate the safety and long-term efficacy of fistulotomy and primary sphincteroplasty (FIPS), and evaluate its impact on postoperative continence status and patients' satisfaction.

Methods/Interventions: Between June 2006 and May 2017, 203 patients (139 males; mean age: 48.7 years) affected by cryptoglandular anal fistulas underwent FIPS. All patients were evaluated by standardized telephone interview. Main outcome measures evaluated were: fistula healing, continence status, and patient's satisfaction (by VAS scale).

Results/Outcome(s): Fistulas treated were intersphincteric in 58 patients (28.6%), and transsphincteric in 145 (71.4%, 60 low, 85 medium-high). In 103 patients (50.7%) fistulas were complex. At a mean follow-up (FU) period of 55.9 ± 30.9 months (range, 12-143), the healing rate was 92.6% (188 patients). Preoperatively, 8 patients (3.9%) were affected by post-defecation soiling, and 2 patients (1%) by gas incontinence. Postoperatively, 26 patients (12.8%) complained of continence impairment, mainly consisting of post-defecation soiling (20 patients, 9.8%); the overall CCFIS did not significantly change

(preoperative, 0.04; at FU, 0.49). None of the potential predictive factors of healing was statistically significant at the univariate analysis. At the univariate analysis patients affected by a recurrent ($p=0.002$), complex ($p=0.012$), with secondary tracts ($p=0.004$), with previous setons drainage ($p=0.0001$), were at higher risk of incontinence; at the multivariate analysis, the only significant factor was the fistula complexity ($p=0.050$). The mean VAS patients' satisfaction rate was 9.3 ± 1.6 ; patients affected by a transsphincteric ($p=0.011$), complex ($p=0.0001$), with secondary tracts fistula ($p=0.041$), or with previous setons drainage ($p=0.008$), and postoperative continence impairment ($p=0.0001$) had a lower satisfaction rate. At the multivariate analysis, the only factor associated with a lower satisfaction rate was the postoperative onset of incontinence ($p=0.0001$).

Conclusions/Discussion: FIPS should be considered a valid therapeutic option for selected anal fistulas, giving a good healing rate, and providing high patients' satisfaction. However, a risk of post-operative minor fecal incontinence exists, and it should be considered and discussed with patients.

LOWERING THE THREAT LEVEL ON PERIANAL ABSCESSSES IN THE SAFETY-NET HOSPITAL ED: DO WE ACTUALLY NEED TO COVER FOR MRSA?

P492

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Purpose/Background: Perianal abscesses are frequently encountered by ED physicians and surgeons. Treatment is usually incision and drainage with or without antibiotics. Prior studies report Methicillin-resistant *Staphylococcus aureus* (MRSA) rates in up to one-third of cultures.

Methods/Interventions: We conducted a retrospective chart review of all perianal abscesses which presented to an inner city safety-net hospital ED over a 5 year period. ICD9 coding was used to identify patients within the hospital's electronic medical record.

Results/Outcome(s): 220 patient were identified. Mean age 42 years, 71% male, 88% Black, 6% Hispanic, 0.9% White. 75.1% were cultured at the time of drainage. Of those, 29.9% grew non-MRSA skin flora, 25.5% grew gastrointestinal bacteria, 16.6% grew MRSA, and 13.4% were mixed, 14.6% were no growth. 93% of patients received antibiotics. Overall recurrence was 19.7% within 1 year of follow up.

Conclusions/Discussion: Despite widespread concern for MRSA, community acquired perianal abscesses in an inner city safety-net hospital grew MRSA less frequently than reported in the general population.

ADULT PATIENTS WITH HIRSCHSPRUNG'S DISEASE – A NATIONAL ANALYSIS OF OUTCOMES.

P493

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Purpose/Background: Hirschsprung's disease is a rare disease that normally presents during the newborn period and is infrequently diagnosed in the adult population. Diagnosis in adults typically occurs when there is a very short segment of aganglionosis within the colon. In infants, surgical correction of this disease typically involves excision of the diseased segment of bowel and an anastomosis between healthy colon and the proximal anal canal. Given the rarity of this condition, little is known about the treatment and outcomes for adults with Hirschsprung's. We aim to describe the prevalence of this disease and identify the types of operations and outcomes for adults with Hirschsprung's disease using a national database.

Methods/Interventions: Rush University Medical Center IRB approval was obtained. The National Surgical Quality Improvement Program Participant Use Files from 2012-2016 were queried for the diagnosis of "Hirschsprung's Disease" using International Classification of Disease, Ninth (ICD) code 751.3 and ICD-10 Code Q43.1 for patients 18 years or older. The Current Procedure Terminology (CPT) codes and description of procedures were examined and divided into two groups depending on goal of procedure: restoration of bowel continuity versus diversion. Clinicopathologic data and 30-day outcomes were analyzed and compared between the two groups. Data was analyzed using Microsoft Excel and SPSS v22.

Results/Outcome(s): Thirty-five patients were identified who had Hirschsprung's who were 18 years or older. Three patients did not undergo surgery and were excluded from the analysis. A total of 32 patients were analyzed. Of these patients, 24 (75%) were male. The median age of the entire cohort was 29 years old. Overall, most patients were relatively healthy with few co-morbidities, which included end stage renal disease requiring dialysis (n=1) and ventilator dependence (n=1). No patient in the cohort had heart failure, COPD, ascites, disseminated cancer, or bleeding disorders. Fourteen patients (43.8%) underwent diversion and 18 (56.2%) underwent restorative procedures. One patient in the diversion group had Systemic Inflammatory Response Syndrome preoperatively and also had septic shock postoperatively. The median age at time of operation was 49.5 years old for the diversion group and 23.5 years old for the reconstructive group ($p=0.001$). Due to the small population size, we were unable to control for age or ASA when analyzing the remaining data. Emergency operations were performed in 4 patients (29%) in the diversion group compared to only 1 (5%) in the restorative group ($p=0.14$). The restorative surgery group

was more likely to have a low ASA (1-2) while those in the diversion group were more likely to have a higher ASA (3-5) ($p=0.011$). The median length of stay for patients receiving diversion surgery was 9.5 days and 5 days for the restoration group ($p=0.045$). Complications occurred in 8 (57%) patients in the diversion group and in 4 (22%) patients in the restoration group ($p=0.049$). Mortality occurred in one patient in the diversion group and none in the restorative group. There were no statistically significant differences in operative wound class, operative time, postoperative superficial or deep space infections, blood transfusions, sepsis, reoperation or readmission. VTE, acute renal insufficiency, urinary tract infection, stroke, or myocardial infarction did not occur in either group.

Conclusions/Discussion: This is the first study using national data to evaluate the surgical care of Hirschsprung's disease in adult patients. Both diversion procedures and restoration of bowel continuity were performed. Overall, these procedures are generally well tolerated with low major morbidity and mortality rates. Patients undergoing diversion procedures were significantly older, tended to have a higher ASA classification and a longer length of stay than those undergoing restorative procedures. The diversion group also had higher 30-day postoperative morbidity rate. Given the rare and complicated nature of this disease but the high likelihood of requiring surgery, adult patients with Hirschsprung's should be treated at a tertiary care center with access to both pediatric and colorectal surgery subspecialists.

ARE WOMEN MORE VULNERABLE TO MORTALITY FROM DIVERTICULITIS?

P495

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Purpose/Background: We hypothesized that there are variations in mortality from diverticular disease by gender.

Methods/Interventions: We analyzed the Center of Disease Control (CDC) WONDER national registry to identify all deaths in the United States with an Underlying Cause of Death (UCOD) of diverticulitis from 1999-2016. Age-adjusted death rates were calculated from weighted averages of the age-specific death rates per 100,000 persons. A standard age distribution of ten-year age groups was chosen and the age-specific death rates were weighted according to this standard. Demographics, place of death, and secondary causes of death were also examined to generate a narrative at time of death.

Results/Outcome(s): During the study period, a total of 55,096 patients (0.12%) died with an UCOD of diverticulitis from a total of 44,915,066 deaths (Table). Females were disproportionately more likely to die from diverticulitis than males (0.17% F vs. 0.08% M, $p<0.001$). Across

all years, age-adjusted incidence of death was higher for females as compared to males. Despite the high rate of death in females, male patients were more likely to die within the hospital compared to females (OR 1.40, CI 1.34-1.46, $p < 0.001$). Additionally, males with an UCOD of diverticulitis were significantly more likely to have a surgical complication as their secondary cause of death (OR 1.40, CI 1.28-1.52, $p < 0.001$). Conversely, female patients were more likely to die either at nursing homes or hospice (OR 1.64, CI 1.55-1.73, $p < 0.001$). Female patients were more likely to have non-surgical complications related to diverticulitis as their secondary cause of death, most common being intestinal infections including sepsis (OR 1.04, CI 1.01-1.08, $p < 0.03$) or chronic pelvic fistulizing disease (OR 1.43, CI 1.23-1.66, $p < 0.001$).

Conclusions/Discussion: Females have a higher incidence of diverticular disease mortality. Their deaths are more commonly secondary to non-surgical infections related to disease, i.e. sepsis or pelvic fistulae. Female patients represent a particularly vulnerable population that may benefit from more intensive diverticulitis surveillance and treatment.

Table. Diverticulitis as UCOD in United States, 1999-2016			
	Female (n=22,569,507)	Male (n=22,345,559)	p value
UCOD of Diverticulitis, n (%)	37365 (0.17%)	17731 (0.08%)	<0.001
Place of Death, n (%)			
Hospital	27351 (73.2%)	14048 (79.2%)	<0.001
Nursing Home	4265 (11.4%)	1372 (7.7%)	
Hospice	2606 (8%)	772 (4.2%)	
Home	2243 (6%)	1195 (6.7%)	
Other	900 (2.4%)	344 (1.9%)	
Secondary Cause of Death, n (%)			
Non-surgical infections	15497 (41.5%)	7175 (40.5%)	0.03
Pelvic Fistula Disease	694 (1.9%)	232 (1.3%)	<0.001
Surgical Complications	1461 (3.9%)	953 (5.4%)	<0.001

* UCOD, Underlying Cause of Death

ANAL FISSURES - AFTER A FAILED LATERAL INTERNAL SPHINCTEROTOMY, BOTULINUM TOXIN TO THE RESCUE?

P496

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Purpose/Background: A chemical sphincterotomy with botulinum toxin (BT) is one option in patients with anal fissures who fail initial dietary modification, local measures and topical therapy. A Cochrane review reported that BT was only marginally superior to placebo, notwithstanding a low complication rate. The aim of this study was to evaluate the effectiveness of BT treatment for anal fissures to determine what role BT may have in this setting.

Methods/Interventions: A retrospective cohort study was conducted of all patients treated with BT for anal fissures at one academic institution from 2013 to the present. Data were collected on demographics, duration of symptoms, previous treatments, dose and method of BT used, healing rates and complications.

Results/Outcome(s): 37 patients (19 male) who had undergone BT treatment for primary and recurrent anal fissures were identified over the study period, with an average age of 43 years. Overall healing was achieved in 48.6% of patients (18/37 patients) at an average follow-up of 6.5 months. BT doses ranged from 50 to 100 units. Lower BT doses were as effective as higher doses. Further analysis revealed a markedly higher healing rate in patients undergoing BT treatment after failed lateral internal sphincterotomy (n=11) compared to patients undergoing BT as primary treatment (healing rate of 72.7% vs 38.5%, $p = 0.06$). Morbidity was limited, with two patients having minor bleeding, three patients experiencing transient fecal incontinence, and one patient developing anal stenosis which ultimately required an anoplasty.

Conclusions/Discussion: BT was associated with only modest overall healing of anal fissures in this study, albeit with a low complication rate. This is consistent with previously published reports. However, the results of BT for recurrent fissures following a failed lateral sphincterotomy were much more encouraging with an almost doubled healing rate. In view of its lower morbidity, we propose BT is preferable to repeat lateral internal sphincterotomy and should be the treatment of choice for recurrent anal fissures.

LIVER ABSCESS IN THE SETTING OF DIVERTICULAR DISEASE; SHOULD ALL PATIENTS HAVE COLECTOMY?

P497

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Purpose/Background: We sought to determine outcomes of liver abscess attributed to diverticular disease while assessing results in the setting of diverticulosis as compared to diverticulitis.

Methods/Interventions: First, we identified all patients with a discharge diagnosis of liver abscess attributed to diverticulosis or diverticulitis at a tertiary care facility. Next, we abstracted patient demographics, comorbidity, CT results, clinical findings, interventions, and clinical course. Then, we determined outcomes of readmission, need for surgical intervention, and/or need for further medical care for diverticulosis as compared to diverticulitis.

Results/Outcome(s): From a cohort of 4,039 patients with diverticular disease, we identified 42 patients with liver abscess and diverticulosis (n=16) or liver abscess and diverticulitis (n=26). There was no difference in patient demographics for diverticulosis or diverticulitis. During treatment, 80.9% of patients underwent abscess drainage (81.3% diverticulosis and 80.7% diverticulitis) while the remainder were treated with antibiotics alone. Mean length of initial hospital stay was 5.4 days and not different between those with diverticulosis versus diverticulitis ($p < .5$). However, 23% of

patients with diverticulitis and liver abscess were readmitted within 30 days as compared to 0% of patients with diverticulosis and liver abscess ($p=0.03$). Colectomy was performed in 54% of patients with diverticulitis and liver abscess but in none of the patients with diverticulosis ($p<0.0001$). In fact, 57% of colectomies performed in patients with liver abscess and diverticulitis were performed because of repeat diverticulitis admission/treatment. Despite zero colectomies performed for liver abscess attributed to diverticulosis, these patients never re-presented with another liver abscess or developed more advanced diverticular disease over a mean follow-up of 8 years.

Conclusions/Discussion: Patients diagnosed with liver abscess in the setting of diverticulitis have a more complicated course that often leads to readmission and surgery. In our small group of patients with liver abscess attributed to diverticulosis, no patients progressed to development of more active diverticular disease or recurrent liver abscess. Sigmoid resection for patients with liver abscess in the setting of diverticulosis should be reconsidered given the low likelihood of recurrent issues.

THE IMPACT OF FRAILTY ON MORBIDITY AND MORTALITY FOLLOWING COLORECTAL EMERGENCIES.

P498

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Purpose/Background: Colorectal emergencies pose difficult management dilemma and are associated with considerable morbidity and mortality to patients. Elderly patients presenting with colorectal emergencies pose even more difficult management dilemma. It is paramount to consider the pre-morbid functional status of these patients prior to embarking on an operative management. Perioperative considerations would be around the limited reserve that these patient populations have. Recent studies have shown that age alone is not the best independent predictor for a poor postoperative outcome, nor is it a predictor for patients' physiological reserve. We aim to compare the predictive value of modified frailty index, CR-POSSUM score, and age on morbidity and mortality after colorectal emergency operations, with particular focus on octogenarians.

Methods/Interventions: We performed a single centre, retrospective review of patients who presented to our Colorectal Surgery Unit with colorectal emergencies (Obstruction, Perforation, Haemorrhage, Ischaemia, Sepsis) requiring an operation between the period 2011 and 2015. We compared older adults (above 40 years old and below 60 years old), elderly (60 - 79 years old) and octogenarians (80 years old and above) in terms of overall morbidity and mortality. CR-POSSUM score and modified Frailty Index 5 (mFI-5) were used to assess patients' frailty. Epidemiology, operative data, and operative management

were analysed. Subgroup analysis made comparing elderly, frail elderly and octogenarians.

Results/Outcome(s): We had 652 colorectal emergency presentations during the five-year period. The bulk of our patients were older adults. Elderly patients constitute 36.2%, and octogenarians 17.9% of the presentation, with no significant difference in their ASA score. Octogenarians showed a trend towards a worse overall morbidity and mortality when compared with adults and elderly patients. Further subgroup analysis was performed to compare a higher risk group of frail elderly patients, with non-frail elderly and octogenarians. We found that frail elderly patients had a higher morbidity and mortality risk, almost similar to octogenarians when compared with non-frail elderly or adult patients.

Conclusions/Discussion: We conclude that older and more frail patients who presented with colorectal emergencies have higher overall morbidity and mortality. The prevalence of which is rising. Age does contribute to worse morbidity and mortality, however, level of frailty can provide a better indicator independent of age. mFI5 and CR-POSSUM score can be used to risk stratify frail patients. Both frail elderly and octogenarian patients have higher postoperative complications rate and longer length of stay, compared to non-frail elderly, or older adult patients. A multi-disciplinary care approach is paramount to help improve the outcome of older and frail patients presenting with Colorectal emergencies.

MESENTERIC CYSTIC LYMPHANGIOMA IN AN ADULT - A CASE REPORT.

P499

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Purpose/Background: Mesenteric cystic lymphangioma is a rare, benign malformation of lymphatic vessels. Adult cases are rare, with 80-90% of cases being diagnosed in the first few years of life. Lymphangiomas found in the peritoneal cavity are especially rare, with the majority of these found in the retroperitoneal cavity. Less than 1% of all cystic lymphangiomas are isolated to the mesentery of the small bowel. The aetiology is unclear, but is likely to be due to a congenital abnormality of the lymphatic system causing sequestrations of lymphatics during embryological development). It is suggested that trauma, lymphatic obstruction, inflammation, surgery or radiotherapy may lead to secondary formation of such tumours. Distinction between mesenteric cysts and cystic lymphangioma is imperative as lymphangiomas may follow a proliferative and invasive path. We report the rare case of a mesenteric cystic lymphangioma in a patient who presented to the colorectal outpatient clinic with continued weight loss.

Methods/Interventions: An 81 year old gentleman presented to the colorectal outpatient clinic in a district

general Hospital in the North of England with weight loss and was found to have a mobile intraabdominal mass. He underwent a gastroscopy which revealed coeliac disease on duodenal biopsies, a normal colonoscopy and a CT scan which showed what appeared to be a mesenteric cyst. He went on a gluten free diet but continued to lose weight and hence went on to undergo an MRI and PET scan all of which merely confirmed the cyst in the mesentery, which was noted on each subsequent scan to be increasing in size.

Results/Outcome(s): After several Multidisciplinary team meetings and detailed discussions with the patient, he underwent a laparotomy. A large cystic lesion was found in the mesentery 40cm from the duodenojejunal flexure which was excised from within the mesenteric leaves. He made an uneventful recovery and has started gaining weight now. The initial histopathological diagnosis was a mesenteric cyst - this was reviewed and subsequently confirmed to be cystic lymphangioma instead.

Conclusions/Discussion: This case highlights the differential diagnoses of cystic lesions in the mesenter. The pre-operative diagnosis of a cystic lymphangioma is difficult due to its rarity, multitude of clinical presentations and lack of specific features on radiological imaging. Complete surgical excision is recommended to prevent avoid complications requiring acute surgical intervention: infection, rupture, haemorrhage, volvulus and intestinal obstruction have all been described. Our patient's only complaint was his loss of weight, which has resolved with excision of his enlarging rare mesenteric cystic lymphangioma. Bibliography 1. Chen CW, Hsu SD, Lin CH, Cheng MF, Yu JC. Cystic lymphangioma of the jejunal mesentery in an adult: A case report. *World Journal of Gastroenterology*. 2005; 11(32): p. 5084-5086. 2. Aprea G, Guida F, Canfora A, Ferronetti A, Giugliano A, Ciciriello MB, et al. Mesenteric cystic lymphangioma in adult: a case series and review of the literature. *BMC Surgery*. 2013; 13(1): p. A4. 3. Roisman I, Manny J, Fields S, Shiloni E. Intra-abdominal Lymphangioma. *British Journal of Surgery*. 1989; 76(5): p. 485-489. 4. Jehangir W, Hossain M, Vvich Y, Yousif A, Sen S. Mesenteric Cyst Versus Lymphangioma: A Clinical Conundrum. *The American Journal of the Medical Sciences*. 2015; 350(3): p. 228.

EMERGENCY SURGERY FOR RIGHT COLONIC DIVERTICULITIS HAS A LOW MORBIDITY VERSUS LEFT-SIDED DISEASE.

P500

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Purpose/Background: Right-sided diverticulitis is much more common in Asians compared to Caucasians. Clinically its presentation mimics acute appendicitis. The aim of this study was to analyze and compare the outcome of right colonic diverticulitis with those of left-sided disease.

Methods/Interventions: We conducted a retrospective review of patients presenting with diverticulitis from 2004 to 2014 to a tertiary referral unit. Patient demographics, Hinchey classification, need for emergency surgery, perioperative outcome and recurrence were evaluated.

Results/Outcome(s): In total 360 patients presented with diverticulitis, of which 218(61%) were right-sided disease and 142 (39%) were left-sided. The mean age was 61 years. One hundred and fifty-nine (44%) patients were male; 201 (55%) were female. All patients presented with abdominal pain. Leukocytosis and fever were present in 253 (70%) and 136 (38%) patients respectively. The mean hospital stay was 9 days. The majority of patients were Hinchey I (278, 77%) and II (38, 11%). The mean age (Right: 57yrs vs Left: 68yrs; $p<0.001$) and length of stay (Right: 6 days vs 15 days; $p<0.001$) were significantly less in right diverticulitis. Cardiovascular disease ($P<0.001$) and accidents ($p=0.003$) were more likely in patients with left diverticulitis. There was no significant difference in sex or the need for emergency surgery between the 2 groups. One hundred patients (28%) underwent emergency surgery. Sixty-seven (31%) patients with right diverticulitis required emergency surgery however 53 (79%) of these were based on a presumptive clinical diagnosis of acute appendicitis. When these were excluded, left diverticulitis patients were more likely to require emergency surgery (Right 4% vs Left 9%, $p<0.001$). Postoperative morbidity was also significantly higher (Right 7% vs Left 36%, $p<0.04$). There was no difference in operative or 30-day mortality. Recurrence rate was 8% and 10% in right and left-sided disease respectively ($p=0.6$).

Conclusions/Discussion: Diverticulitis of the right colon is a common clinical entity in the Asian population. Without proper imaging, their presentation can often be confused with appendicitis. Patients are younger and the disease course is more benign. In cases where emergency surgery is required, right-sided diverticulitis is associated with a lower operative morbidity compared to left-sided disease.

ABNORMAL VITAL SIGNS ARE COMMON AFTER LAPAROSCOPIC OR OPEN BOWEL RESECTION AND ARE POOR PREDICTORS OF ANASTOMOTIC LEAK.

P501

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Purpose/Background: Anastomotic leak is the most feared complication in patients undergoing colorectal resection. While vital signs are often cited in morbidity conferences as evidence of anastomotic leak, it has been shown that abnormal vital signs are actually ubiquitous after open bowel resection, even in patients with an otherwise entirely uncomplicated recovery. Laparoscopic surgery, though, minimizes the inflammatory response,

and may be less likely to result in aberrant physiology. Here we hypothesize that abnormal vital signs in patients undergoing laparoscopic colorectal surgery are uncommon and better predictors of anastomotic leak than in patients undergoing open surgery.

Methods/Interventions: We performed a retrospective study of all adult patients undergoing small bowel or colon resection at a tertiary care academic center between 11/14/2011 and 9/28/2018. We used the systemic inflammatory response syndrome (SIRS) criteria to define abnormal vital signs: temperature > 100.4°F, pulse > 100 beats per minute, respiratory rate > 20 breaths per minute, and WBC > 12,000. The medical record of all patients with a CPT/ICD9 code suggestive of anastomotic leak were individually reviewed; leak was confirmed either radiographically with a CT-scan/barium enema showing contrast extravasation or a fluid collection adjacent to the anastomosis, or clinically by review of the operative report from reoperation. Area under the receiver operator characteristic curve (AUC) was used to assess the predictive value of each vital sign for anastomotic leak within the first ten days after surgery. AUC > .65 was considered predictive.

Results/Outcome(s): During the study period, 1777 patients underwent small bowel and/or colon resection. Of these, 925 (52.1%) underwent laparoscopic surgery and 852 (47.9%) underwent open surgery. Anastomotic leak was diagnosed in 49 (2.8%) patients. We found that abnormal vital signs during the first three postoperative days were very common during laparoscopic or open surgery, even in patients whom did not develop anastomotic leak. The most frequent abnormal vital sign in patients who did not have anastomotic leak was tachycardia (82.1% open cohort, 67.6% laparoscopic cohort), while tachypnea (39.6% open, 20.5% laparoscopic) and leukocytosis (36.1% open, 28.0% laparoscopic) were frequent but less common. The most frequent abnormal vital sign in patients who did develop anastomotic leak was also tachycardia (100% open, 66.6% laparoscopic). To further explore the predictive power of abnormal vital signs, AUC analysis was performed. For open surgery, only tachycardia was predictive of anastomotic leak (AUC 0.66, 95% CI 0.5809-0.7403), whereas only leukocytosis was predictive of anastomotic leak in the laparoscopic cohort (AUC 0.72, 95% CI 0.569-0.8799). No other vital sign discriminated patients with an anastomotic leak (Table 1).

Conclusions/Discussion: Abnormal vital signs in patients following open and laparoscopic surgery are ubiquitous and remain poor predictors of anastomotic leak.

	AUC Score (95% CI)	
	Laparoscopic	Open
WBC	0.72 (0.57-0.88)*	0.53 (0.44-0.63)
Respiratory Rate	0.59 (0.46-0.72)	0.61 (0.51-0.71)
Temperature	0.56 (0.39-0.73)	0.46 (0.37-0.55)
Pulse	0.53 (0.38-0.68)	0.66 (0.58-0.74)*
Diastolic Blood Pressure	0.41 (0.30-0.52)	0.44 (0.34-0.54)
Systolic Blood Pressure	0.32 (0.20-0.45)	0.48 (0.38-0.56)

*Significant predictor of anastomotic leak (AUC >0.65)

THE BARENESS OF EXTERNAL ANAL SPHICTER: A NEW TECH FOR RELAPSED HIGH HORSESHOE ANAL FISTULA.

P502

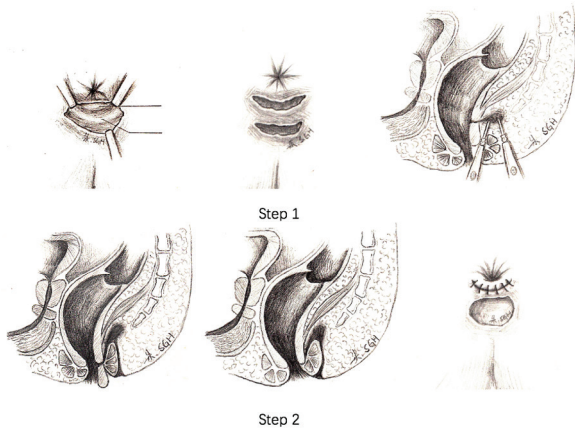
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Purpose/Background: Horseshoe anal fistula represents a complex disease entity of the floor, which may represent 15-20% of fistulous lesions in the anorectal region and has a high recurrence rate ranging from 7.7-28.6%. Relapsed high horseshoe anal fistula is a more serious condition accepted at present as one of the incurable anorectal diseases. Iatrogenic injury caused by primary operation leads to abnormal anatomical structure, which makes secondary operation more difficult. Techniques including Hanley's procedure can easily lead to postoperative anal deformation anal incontinence. How to protect the shape of the anus and preserve the function of the anal sphincter while reducing the recurrence rate is the goal of our study. The authors conducted a prospective study to evaluate the efficacy of The Bareness of External Anal Sphincter in the treatment of the relapsed high horseshoe anal fistula.

Methods/Interventions: All consecutive 12 patients, those who have relapsed high horseshoe anal fistula from December 2016 to August 2018, were included in the prospective cohort study. All patients were diagnosed with preoperative MRI scan. Bare the posterior external sphincter of the anal canal fully through both the intersphincter approach and the outer external sphincter approach. The space beneath the levator ani was curetted and cleaned. Push the naked free external sphincter toward the levator ani, and fasten it with several sutures against internal sphincter. The incontinence scores were measured.

Results/Outcome(s): There were no serious complications and anal incontinence after operation. The average age was 35.1 years (23-45 years), 8 males (66.7%) and 4 females (33.3%). Two (16.7%) had two previous fistula repairs, and 10 cases (83.3%) had once. The mean operation time was 32 minutes (25-48 minutes). The average day of hospitalization was 8.1 days (5-21 days). The average cure time was 6.3 weeks (5-8 weeks). The mean follow-up period was 11.5 months (3-22 months). The cure rate was 91.7% (1:11).

Conclusions/Discussion: The Bareness of External Anal Sphincter is a efficient minimally invasive treatment for recurred high horseshoe anal fistula, which is worthy of a larger long-term clinical evaluation.



The Bareness of External Anal Sphincter

ROLE OF CLIPPING IN DELAYED HEMORRHAGE PREVENTION FOLLOWING ENDOSCOPIC MUSOSAL RESECTION OF LARGE GI LESIONS.

P503

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Purpose/Background: Endoscopic mucosal resection (EMR) is a minimally invasive endoscopic surgical procedure used for staging and treatment of superficial large gastrointestinal (GI) lesions. EMR is associated with a high risk of postpolypectomy complications including delayed bleeding, which can increase morbidity, healthcare use, and associated costs. The use of prophylactic clip closure may reduce the incidence of postpolypectomy delayed bleeding as well as lesion recurrence.

Methods/Interventions: The data of 310 patients with 354 upper and lower GI lesions were collected from 2/2013 to 8/2018 at our institution. Based on the patients' medical records and procedural details, all endoscopic mucosal resection maneuvers were retrospectively evaluated for duration, estimated procedural blood loss, delayed hemorrhage, number of clips used, and length of hospital stay.

Results/Outcome(s): 354 EMRs with clipping were performed in 310 patients. BMI ($p=0.0103$), lesion size (0.0193), and site (0.0258) were significantly associated with recurrent lesion events. Multivariate logistic regression model including BMI and lesion size as independent variables revealed both were significant risk factors for recurrent lesion events. Patients with BMI ≥ 30 were more likely to experience a recurrent lesion event compared to BMI < 30 (OR=2.60, $p=0.0287$). Patients with lesion size > 25 mm were at higher risk for recurrent lesion event (OR=2.71, $p = 0.0343$). In addition, Spearman correlation coefficient between lesion size and length of maneuver was 0.35 ($p < 0.0001$), which means lesion size and length of maneuver were significantly correlated. 8/310 (2.58%)

patients were admitted and 2(0.64%) were transfused for significant hemorrhage, for a total postpolypectomy hemorrhage rate of 2.58%; there were no perforations.

Conclusions/Discussion: Prophylactic complete clipping of large GI lesions avoids post-EMR perforation and significantly lowers clinically significant bleeding. BMI, lesion site, and size were significantly associated with recurrent lesion events.

PERCUTANEOUS TRANSHEPATIC ACCESS WITH LIQUID SCLEROTHERAPY AND COIL EMBOLIZATION OF PERISTOMAL VARICES.

P504

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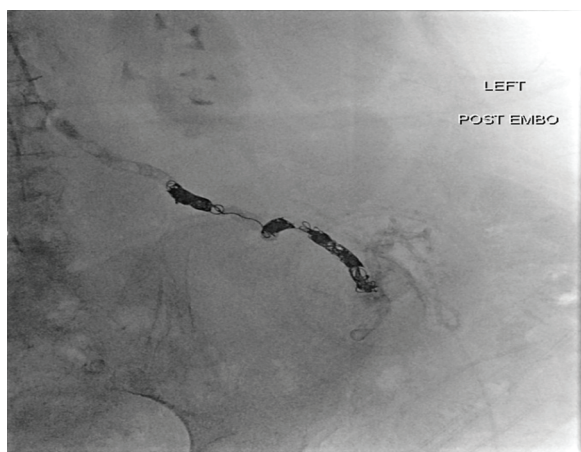
Purpose/Background: Peristomal varices are a rare cause of stomal bleeding that can lead to recurrent and potentially life threatening hemorrhage. Local therapeutic options including applied pressure, topical epinephrine, chemical cautery with silver-nitrate, injected sclerotherapy, and suture ligation. Medical therapy utilizes Beta blockage. Surgical interventions include stoma revision or transjugular intrahepatic portosystemic shunt. Few attempts to treat peristomal varices with embolization have been reported with varying degrees of success. We present a case of parastomal varices that were successfully treated with percutaneous transhepatic access with liquid sclerotherapy and coil embolization without complication. A 72-year-old female who underwent diverting loop colostomy for colovesical fistula secondary to diverticulitis presented to an outside hospital with recurrent bleeding from her colostomy. She presented with a hemoglobin of 6.9 and required multiple transfusions. Past medical history included cirrhosis of unknown etiology. The patient had undergone multiple EGDs, colonoscopies, a nuclear bleeding scan, and capsule endoscopy at an outside hospital that had all failed to identify a source of bleeding. Cauterization of the colostomy was performed without cessation of the hemorrhage. The patient was transferred to our institution for further evaluation. Upon admission, the patient was hemodynamically stable. On exam, the patient was found to have a blue halo around the stoma consistent with peristomal varices. No hemorrhage was noted in the proximal or distal ends of the colostomy, however focal bleeding was observed at the stomal edge. A colonoscopy was performed which demonstrated no additional sources of bleeding.

Methods/Interventions: The patient underwent pre-operative optimization, including blood transfusions and diuresis for an exacerbation of congestive heart failure. An abdominal visceral venogram was performed via percutaneous transhepatic access, identifying a patent main, right, and left portal vein with extensive peristomal

varices supplied by distal branches of the superior mesenteric vein. She subsequently underwent sclerotherapy with 3% Sodium Tetradecyl sulfate/ethiodol solution and coil embolization.

Results/Outcome(s): Post-operatively the patient's diet was advanced, hemoglobin was followed, and ostomy output was monitored. The patient was noted to have a stable hemoglobin with cessation of bleeding from the ostomy. The patient was discharged on post-operative day two. To our knowledge, the patient has not had any further episodes of bleeding >1 month later

Conclusions/Discussion: The patient in this study was experiencing recurrent peristomal variceal bleeding that was refractory to cauterization. As the patient had failed previous conservative management, required multiple transfusions with packed red blood cells, and had cirrhosis of unknown etiology, based on limited previous success of sclerotherapy and embolization, it seemed appropriate that our patient may benefit from this procedure. Given our patient's underlying medical comorbidities (congestive heart failure, coronary artery disease, myelodysplastic syndrome, and atrial fibrillation), a more definitive surgical intervention that was less invasive than an ostomy revision was desired. Transjugular intrahepatic porto-systemic shunt was avoided due to increased incidence of encephalopathy. In whole, the patient tolerated the procedure without complication. Hemoperitoneum is the most common complication associated with the procedure, with other complications including bile leak, liver trauma, and portal thrombosis. Further follow up with patient is required to understand long-term risks and benefits of this procedure.



Peristomal varices post-embolization

ENDOMETRIOSIS: A RARE CAUSE OF RECTAL OBSTRUCTION.

P505

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Purpose/Background: Large bowel obstruction is a frequent problem facing the general surgeon. Cause of obstruction can be benign or malignant. They can also be classified as extrinsic to the bowel wall, intrinsic to the bowel wall, within the bowel lumen, or bowel torsion. The most common cause of distal rectal obstruction is malignant neoplasm, most commonly colorectal. Non-neoplastic conditions may mimic obstruction of the colon. We present a case of rectal obstruction due to endometriosis as an uncommon cause of rectal obstruction, and as a reminder that benign conditions may present as an acute large bowel obstruction.

Methods/Interventions: Case presentation and review of the literature.

Results/Outcome(s): We discuss a patient presenting with large bowel obstruction. Initial treatment was diversion, allowing the cause of her obstruction to be defined as endometriosis. Subsequent surgery allowed resection and closure of her colostomy. Her recovery was uneventful.

Conclusions/Discussion: The patient is a 33 year old woman who presented to the emergency department with ten days of obstipation, nausea, and abdominal distention. She reported typically having daily bowel movements with no blood in her stools. There was no weight loss prior to presentation. Her computed tomography (CT) imaging was concerning for a large bowel obstruction from a sigmoid volvulus. A flexible sigmoidoscopy was performed with findings of a complete obstruction of the upper rectum without any mucosal lesions seen. She was taken to the operating room for further exploration. Within the pelvis, there were dense inflammatory like adhesions causing an obstruction to the upper rectum. The uterus was not able to be dissected free from the anterior surface of the rectum. The right ovary had a large cyst adherent to the rectum. It was unclear if the pathology was a rectal cancer that would require a radical excision of adjacent pelvic organs, therefore the decision was made to make a diverting end sigmoid colostomy with a mucous fistula. The appendix, which was a part of the inflammatory process, was removed. The patient recovered without complications. The final pathology seen on the appendix was endometriosis and with the lack of any evidence of neoplastic process causing her rectal obstruction, the diagnosis was rectal obstruction secondary to endometriosis. She was recommended to start on a gonadotropin-releasing hormone agonist (GnRHa) leuprolide (Lupron) however, this medication was too expensive and therefore transitioned to the GnRHa danazol. She completed a six month course, and then had her ostomy reversed along with a resection of the strictured rectum, right ovary,

and a short segment of ileum. The pathology report for all segments was endometriosis. The rectal segment had transmural endometriosis. Endometriosis results from the presence of endometrial glands and stroma outside of the uterus. When symptomatic, patients experience pelvic pain and infertility. The total volume of endometriomas do not appear to correlate to severity of disease. Up to 1/4th of patients will have intestinal symptoms. Of those, 70% will involve the recto sigmoid junction. Patients typically describe constipation, diarrhea, decrease in stool caliber and tenesmus. The differential includes malignancy and inflammatory bowel disease. Deposits of endometriosis are most commonly seen in the ovaries and utero sacral ligament but can also be seen in the posterior cul-de-sac and appendix. Our patient had appendiceal, ovarian, and posterior cul-de-sac involvement. Diagnosis can be difficult for the surgeon as the mucosa often appears normal on colonoscopy and CT often is non-diagnostic. Transvaginal ultrasound can be useful along with magnetic resonance imaging (MRI). Often direct visualization on diagnostic laparoscopy confirms the diagnosis. Initial treatment is usually medical with GnRHa analogs. These medications work about half the time in relieving pelvic pain or infertility. Surgery is reserved for failure of medications to resolve symptoms or complications like stricture or obstruction. When operating, the goal is to remove all implants and preserve fertility if possible or if desired by the patient. This is often performed in conjunction with a gynecologist. Superficial lesions can be excised locally while deep, infiltrating lesions require segmental resection. Medical treatment is least likely to resolve these deep infiltrating gastrointestinal lesions and require aggressive surgical resections. However, a combination approach of 3-6 months of GnRHa therapy prior to surgical resection can have the benefit of reducing the size of implants and local inflammation.

INTESTINAL TUBERCULOSIS IN SETTING OF TERMINAL ILEITIS IN PATIENT WITH SEPTIC SHOCK AND PNEUMONIA.

P506

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Purpose/Background: Ileitis, defined as inflammation of the ileum, can provide a challenge in defining the causative diagnosis. Ileitis is concerning for a diagnosis of Crohn's disease, malignancy, drug reactions, infectious, or systemic inflammatory processes. Additionally, patients in septic shock can present with ischemic ileitis given episodic hypotension. The purpose of this case study is to highlight an unusual presentation of terminal ileitis. A 79-year-old male presented to our hospital after being found at home with altered mental status of unclear etiology. He had a past medical history of seizures, migraines and a heller

myotomy for achalasia. He briefly visited Mexico 10 years ago otherwise had no foreign travel. He was worked up for septic shock requiring resuscitation and pressors. A CT scan of abdomen and pelvis demonstrated a multi-lobar pneumonia in addition to terminal ileitis. He was started on cefepime, metronidazole, vancomycin and azithromycin for presumed health care acquired pneumonia. Blood cultures were then positive for clostridium paraputrificum bacteremia for which he was narrowed to a short course of metronidazole. He underwent a colonoscopy, which demonstrated erythema and ulceration at the ileocecal valve with concern for an abnormal mass like appearance. Biopsies were taken that demonstrated active chronic non-necrotizing granulomatous inflammation and pyloric glandular metaplasia suggestive of Crohn's disease or infectious etiology. A CEA was normal.

Methods/Interventions: The patient underwent single site laparoscopic ileocelectomy, during which we noted significant right lower quadrant inflammation, dense lymphadenopathy, and mesenteric inflammation. A palpable ileocecal mass was noted extending approximately 15 cm to the terminal ileum. On further evaluation there was an additional palpable ileal mass noted about 30 cm proximally. Both areas were included in the resection specimen, which was sent to pathology.

Results/Outcome(s): The patient had an unremarkable hospital course and was discharged home without issue on post-operative day 5. Pathology demonstrated necrotizing and non-necrotizing granulomatous inflammation extensively and transmurally involving the ileum, ileocecal valve, and right colon with rare mycobacterial organisms compatible with mycobacterial ileitis/colitis. Based on this finding, the patient was readmitted for further evaluation. He underwent a bronchoalveolar lavage. His quantiferon tb was positive. His case was reviewed at the infectious disease conference and the patient was treated for tuberculosis with a combination of rifampin, pyrazinamide, ethambutol and isoniazid. His sputum cultures grew acid fast bacilli after one month. He is currently doing well without respiratory or bowel complaints. He has followed up with his primary care physician without further concerns.

Conclusions/Discussion: We describe a complex presentation of intestinal tuberculosis. The patient's original presentation in septic shock with concern for multifocal pneumonia led to low suspicion for a gastrointestinal source. His blood cultures were pivotal in shifting the focus of his care onto concerns for a malignant mass in his terminal ileum. This patient benefitted from the multidisciplinary care with our pulmonary and infectious disease colleagues. His source of septic shock was then considered more likely bacterial translocation due to his intestinal illness. His history of achalasia and seizures may have led him having aspiration pneumonia. Of note, this patient was low risk for tuberculosis exposure. The potential for devastating public health consequences and propagation of disease exist in unusual cases of terminal ileitis. Our

patient was diagnosed with intestinal tuberculosis prior to a positive sputum diagnosis. Ultimately, it is important to maintain a high level of suspicion in patients with uncommon presentations to prevent a delay in diagnosis or treatment of the disease.



Terminal ileitis

IMPACT OF DESMOID DISEASE AND ANAL TRANSITIONAL ZONE NEOPLASIA ON QUALITY OF LIFE AFTER ILEAL POUCH ANAL ANASTOMOSIS IN PATIENTS WITH FAMILIAL ADENOMATOUS POLYPOSIS.

P507

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Purpose/Background: Restorative proctocolectomy (RP) with ileal pouch anal anastomosis (IPAA) is commonly performed in patients with profuse familial adenomatous polyposis (FAP). Good clinical outcomes are important because patients are usually young and often asymptomatic. However, desmoid disease is common, and anal transitional zone (ATZ) neoplasia is a constant threat. **The aim** of the current study was to evaluate the impact of desmoid tumors and ATZ neoplasia on quality of life (QoL) and pouch survival.

Methods/Interventions: A prospectively maintained ileal pouch database was searched to identify patients with FAP and IPAA. Patients were divided into three groups: patients with FAP alone (controls), those with FAP and desmoids, and those with FAP and ATZ neoplasia. QoL was assessed using the validated Cleveland Global Quality of Life (CGQL) questionnaire. Pouch failure was defined as permanent fecal diversion or pouch excision. Demographics, perioperative morbidity, pouch survival,

reasons for pouch failure and functional results were analysed.

Results/Outcome(s): 250 patients with FAP underwent IPAA from 1983 to 2015. Patients in the three groups were comparable in terms of age, gender, IPAA technique and reservoir configuration (table). 37 (15%) patients with FAP and IPAA developed desmoid tumors. 24 (65%) patients underwent multiple laparotomies for complications of their desmoid. 2 (0.8%) patients had small bowel transplantation; both died. 13 (5.2%) patients had ATZ dysplasia. 13 (5.2%) patients had pouch failure. At most recent follow up, 7 (20%) patients with FAP and desmoids had pouch failure compared to 3 (1.5%) patients with FAP without desmoids ($p < 0.001$). Reasons for pouch failure among those with FAP and desmoids were all related to desmoid disease: in 5 patients obstruction and in 2 cases fistulas. Pouch failure among patients without desmoids were pouch dysfunction and pouch prolapse. Long-term QoL, quality of health and energy levels are shown in the table, and were significantly worse in patients with FAP and desmoids. No difference was seen in QoL restrictions or stool frequency.

Conclusions/Discussion: Pouches should be avoided in patients at high risk of desmoid disease, and the ATZ length should be minimized in patients having a pouch.

THE ANALYSIS OF OUTCOMES OF SURGICAL MANAGEMENT FOR COLONOSCOPIC PERFORATIONS: A 16-YEARS EXPERIENCES AT A SINGLE INSTITUTION.

P508

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Purpose/Background: Colonoscopy induced colonic perforation is often needed surgical management. The aim of present study is analysis to outcomes of surgical management of colonoscopic perforation (CP) at a single institution.

Methods/Interventions: Between Jan 2002 and May 2017, 48 patients who underwent surgery due to CP were retrieved from a retrospective database. Patients were divided into two groups as follows: Group I, diagnostic colonoscopy induced colonic perforation ($n = 25$) and Group II, therapeutic colonoscopy induced colonic perforation ($n = 23$). They were compared with respect to clinical characteristics and outcomes after surgery.

Results/Outcome(s): Most common perforation site was sigmoid colon ($n=19$, 76.0%) in Group I and was transverse colon ($n=10$, 43.5%), sigmoid colon ($n=10$, 43.5%) in Group II ($p=0.013$). Surgery was performed primary closure ($n=16$, 64.0% vs. $n=11$, 47.8%), bowel resection ($n=9$, 36.0% vs. $n=11$, 47.8%) in Group I and II. Rate of stoma was higher in group II ($n=14$, 60.9%) compared to Group I ($n=3$, 12.0%, $p=0.030$).

Re-perforation rate after primary closure was 8.0% (n=2) in Group I and 8.7% (n=2) in Group II (p=0.568). All re-perforation was occurred at primary closure site without wedge resection in both two groups. Among laparoscopic surgery, conversion rate was 20.0% (n=2/10) in diagnostic CP and 33.3% (n=1/3) in therapeutic CP group.

Conclusions/Discussion: Surgery is very critical and important in treatment for CP. Therapeutic CP can be more stoma formation. The selection of the surgical type should be carefully depending on type of CP. Among surgical type, simple primary closure without wedge resection should be carefully selected.

SHOULD WE OPERATE ON RENAL TRANSPLANT PATIENTS WITH DIVERTICULITIS? CONSIDERATIONS FROM THE NATIONAL INPATIENT SAMPLE DATABASE.

P509

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Purpose/Background: Current recommendations for elective surgery for acute diverticulitis remains one of the more controversial points in the management of this disease. However, the decision of when to operate is even less straightforward for post-renal transplant patients. Due to the rarity of this specific patient population, there has yet to be a conclusive study with a large enough study group that provides some guidance for this question. Utilizing the largest available national patient database

over a 9 year period, we hope to detect trends that may provide some insight into this conundrum.

Methods/Interventions: The 2008-2016 National Inpatient Sample (NIS) database was used for this study. We identified renal transplant patients diagnosed with diverticulitis of the colon using ICD-9-CM codes (2008-2015Q3) and ICD-10-CM codes (2015Q4-2016). The patients were separated based on elective admission (ELECTIVE). Univariate analysis was performed for 10 patient characteristics (age, sex, surgery status, race, immunosuppression, smoking, chronic kidney disease, hypertension, hypertension with chronic kidney disease, and diabetes) and 5 patient outcomes (Table 1). Logistic regression fitting for elective admission while adjusting for surgical status was performed on 3 outcomes: severe sepsis, septic shock, and in-hospital mortality.

Results/Outcome(s): Using 9 years of NIS data, 1,552 renal transplant patients were identified as having diverticulitis. Out of our patient population, 1,338 (86.2%) did not have an elective admission. Based on the univariate analysis on patient characteristics, the only factor that was significantly different between the 2 patient groups was surgery status. The univariate analysis did not detect significant differences in severe sepsis, septic shock, and in hospital mortality due to the lack of incidences of these 3 outcomes. However, there was a statistically significant increase in both length of stay and estimated cost for patients that underwent surgery. The multivariate analysis estimated elective admission with decreased adjusted OR (aOR) while surgical interventions increased the aOR for all 3 outcomes. Estimating the interaction aOR for both elective admission and surgery status, renal transplant patients admitted electively who were operated on had

P507 Patients demographics, intraoperative details, functional outcomes and long-term quality of life.

Variable	Familial adenomatous polyposis n=197	Familial adenomatous polyposis + Desmoid disease n=37	Familial adenomatous polyposis +anal transitional zone neoplasia n=13	P value
Age, years	30±12	29±11.2	38±14	0.07
Gender, male	105 (53.2)	16 (43.2)	9 (71)	0.24
S pouch configuration	30 (15.2)	4 (11)	2 (15)	0.74
Handsewn IPAA technique	49 (25)	6 (16.2)	1 (7.8)	0.21
Quality of life	0.8±0.1	0.7±0.2	0.9±0.1	0.04
Quality of health	8.3±1.7	7.2±2.1	8.5±1.6	0.01
Follow up	2.6 (0.3 – 21)	4.1 (0.15-19)	6.2 (0.4 - 23)	0.45
Dietary restriction	58 (29)	10 (27)	5 (39)	0.73
Social restriction	19 (10)	3 (8.1)	1 (7.8)	0.93
Work restriction	30 (15.2)	9 (24.3)	4 (31)	0.17
Patient would not elect to have surgery again	18 (9.1)	4 (11)	1 (7.8)	0.89
Number of stools day	4.7±2.2	5.1±2.1	4.4±2.6	0.63
Pouch failure	3 (1.5)	7 (20)	3 (23.1)	0.01

similar or lower aOR as patients admitted non-electively who were not operated on for the 3 outcomes, except for risk of severe sepsis in the elective surgery patient with an ostomy (aOR = 2.56). Elective non-surgical patients had lower aOR for all 3 outcomes compared to non-elective non-surgery patients.

Conclusions/Discussion: Despite reviewing a large number of records from the NIS database, we struggled to obtain a sufficient number of patients to have enough statistical power to detect a significant difference in most patient characteristics and outcomes for elective admission. However, surgical status and elective admission combined clearly had a strong influence on the outcomes based on multivariate analysis. Surprisingly, our findings suggest that elective operations on renal transplant patients will produce similar outcomes as patients admitted emergently who were not operated on during their admission. Furthermore, most renal transplant patients admitted emergently for diverticulitis did not require an operation during their admission. Patient factors that may help determine when to operate are still unclear based on our study, but the typical set of factors used to select diverticulitis non-transplant patients for elective surgery does not seem to apply to renal transplant patients. A more focused study will be necessary to actually determine factors, if any, that

can influence the outcomes for this small but significant patient population. Given that most renal transplant patients admitted non-electively for an episode of diverticulitis did not require an operation, our findings lend support to operating sparingly on this population.

PERFORMING COLECTOMY ON IMMUNOSUPPRESSED PATIENTS WITH DIVERTICULITIS: HOW CAN WE IMPROVE OUTCOMES?

P510

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Purpose/Background: Most surgeons are hesitant to operate on immunosuppressed patients. In the case of immunosuppressed patients with diverticular disease, there is still ongoing debate about the decision to performing colectomy on an elective basis after an episode of diverticulitis. In this study, we utilized a national clinical database to examine multiple factors that may influence outcomes for immunosuppressed patients undergoing colectomy.

Methods/Interventions: Utilizing the 2010-2017 American College of Surgeons (ACS) National Surgical

P509 Table 1. Patient outcomes for renal transplant patients with diverticulitis by elective admission and surgery status.

	Elective	Non-Elective
a. Severe Sepsis		
No Sigmoidectomy	4 (100.00%)	42 (66.67%)
Sigmoidectomy, No Ostomy	0 (0.00%)	4 (6.35%)
Sigmoidectomy, Ostomy	0 (0.00%)	17 (26.98%)
Fisher's exact P-value= 0.663		
b. Septic Shock		
No Sigmoidectomy	2 (100.00%)	26 (57.78%)
Sigmoidectomy, No Ostomy	0 (0.00%)	8 (17.78%)
Sigmoidectomy, Ostomy	0 (0.00%)	11 (24.44%)
Fisher's exact P-value= 1.000		
c. In-Hospital Mortality		
No Sigmoidectomy	1 (100.00%)	14 (60.87%)
Sigmoidectomy, No Ostomy	0 (0.00%)	3 (13.04%)
Sigmoidectomy, Ostomy	0 (0.00%)	6 (26.09%)
Fisher's exact P-value= 1.000		
d. Median Length of Stay in Days (IQR)		
No Sigmoidectomy	4 (3-7)	4 (2-6)
Sigmoidectomy, No Ostomy	6 (5-8)	12 (7.5-17)
Sigmoidectomy, Ostomy	10 (5-14)	9 (7-18)
Mood's medians test chi2 P-value = <0.001		
e. Median Estimated Cost in \$ (IQR)		
No Sigmoidectomy	10,052 (5,021-16,351)	6,256 (4,301-10,429)
Sigmoidectomy, No Ostomy	17,742 (13,411-22,718)	31,755 (20,715-45,173)
Sigmoidectomy, Ostomy	31,769 (17,836-44,224)	28,898 (19,031-44,203)
Mood's medians test chi2 P-value = <0.001		

Quality Improvement Program (NSQIP) database, we examined immunosuppressed patients who have been diagnosed with diverticulitis to evaluate the differences between elective vs. non-elective colectomy. Multivariate analyses were performed for perioperative outcomes while adjusting for patient characteristics, comorbidities, and type of operation performed.

Results/Outcome(s): A total of 3,254 immunosuppressed patients undergoing colectomy for diverticulitis were identified, of which 1,374 patients (42%) underwent elective surgery. Patients who underwent elective surgery were younger, had a higher BMI, were less likely to have diabetes, hypertension, tobacco use, COPD, not be on dialysis, and had lower wound and ASA classifications. Logistic regression (Figure 1a) showed that most patient outcomes examined were significantly better for colectomy done electively, including wound disruption (aOR=0.42, $p=0.004$), pneumonia (aOR=0.41, $p<0.001$), failure to wean from ventilator (aOR=0.34, $p<0.001$), bleeding (aOR=0.63, $p=0.001$), sepsis (aOR=0.41, $p<0.001$), septic shock (aOR=0.35, $p<0.001$), reoperation (aOR=0.57, $p=0.001$), and mortality (aOR=0.25, $p<0.001$). We also noticed that the laparoscopic approach improved outcomes while fitting our logistic regression model (Figure 1b), including surgical site infection (aOR=0.44, $p<0.001$), wound disruption (aOR=0.38, $p=0.002$), DVT (aOR=0.35, $p=0.003$), failure to wean from ventilator (aOR=0.35, $p<0.001$), acute renal failure (aOR=0.36, $p=0.048$), bleeding (aOR=0.46, $p<0.001$), sepsis (aOR=0.65, $p=0.006$), septic shock (aOR=0.31, $p<0.001$), and mortality (aOR=0.38, $p=0.003$). Since both elective surgery and a laparoscopic approach were fitted in the logistic regression model simultaneously, the aOR was multiplicative.

Conclusions/Discussion: Our findings from this analysis of the NSQIP database suggest that if a colectomy needs to be performed for immunosuppressed patients with diverticular disease, it should be done on an elective basis with a laparoscopic approach to improve outcomes. While it was expected that immunosuppressed patients would have better outcomes with colectomy performed on an elective compared to non-elective basis, we also found that a laparoscopic approach had a significant impact on outcomes in both elective as well as non-elective cases. However, in our analysis, we noted that a laparoscopic approach is utilized in only a very small minority of non-elective operations (13%). Based on our results, a laparoscopic approach to colectomy is underutilized in immunosuppressed patients with diverticulitis. Greater consideration should be given to a laparoscopic approach in immunosuppressed patients who undergo colon resection for diverticulitis, in both elective and non-elective cases.

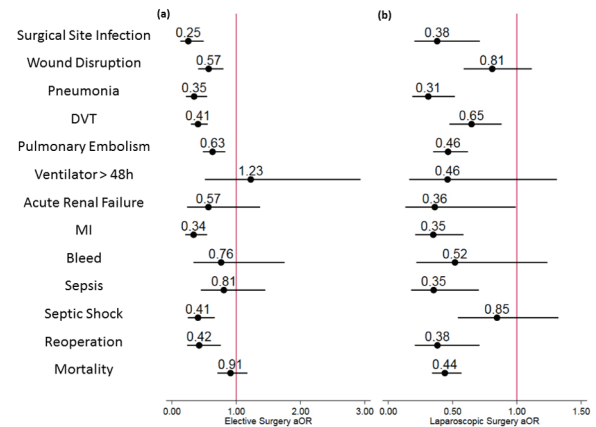


Figure 1. Multivariate analysis of immunosuppressed patient categorical outcomes comparing elective vs. non-elective and laparoscopic vs. open colectomy while including elective surgery, age, BMI, sex, ostomy, laparoscopic, ASA Class, dialysis, diabetes, hypertension, smoke, and COPD in the logistic regression model.

3D LAPAROSCOPIC SURGERY FOR SLOW TRANSIT CONSTIPATION BY TRANSRECTAL EXTRACTION OF SPECIMENS.

P511

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Purpose/Background: To investigate the safety and feasibility of 3D laparoscopic surgery for patients with slow transit constipation via transrectal extraction of specimens.

Methods/Interventions: From May 2015 to January 2017, 8 patients with slow transit constipation who underwent 3D laparoscopic surgery were selected (without incision group), 6 were female and 2 were male, operation of subtotal colectomy with laparoscopy. The initial part of the ascending colon and rectal specimens by direct end-to-end anastomosis, complete removal of the rectal. A comparative study was conducted in patients with prophase slow transit constipation with traditional laparoscopic subtotal colectomy. The perioperative period of the two groups, the postoperative inflammation index, the close, long-term effect and patient satisfaction of the one year after the operation were compared.

Results/Outcome(s): There was no statistical difference between the two groups of baseline data, such as sex, age, BMI, and other baseline data. The operative time in patients without incision group was shorter than that in traditional group, and the amount of bleeding and hospitalization time also decreased. There was no difference in postoperative exhaust time and postoperative complication rate between the two groups. There was no difference between the two groups. The pain score of 6 hours on the day of no incision group was lower than that of the traditional group, and the proportion of additional

analgesic use after first days after operation was less, and the two groups were significantly different. On the first day after operation, the WBC level in the traditional group was higher than that in the non incision group. There was a difference in the level of WBC and procalcitonin in the two groups third days after operation. There was no difference in the levels of interleukin -6 and C reactive protein between the two groups. In the two groups, 1 cases had mild abdominal infection, and 1 cases of the traditional group had fat liquefaction in the incision. At the time of discharge, the symptoms of two groups improved significantly. The longest follow-up time was 31 months, the shortest 14 months, the subjective score of patients was 90 points or more, and the symptoms improved significantly. There were no complications associated with abdominal infection in the long term.

Conclusions/Discussion: Laparoscopic slow transit constipation without incision can achieve consistent short-term and long-term efficacy compared with traditional laparoscopic assisted surgery, and no increase in abdominal contamination. It is a promising surgical method.

LIGATION OF THE INTERSPHINCTERIC FISTULA TRACT: ARE THERE ANY FACTORS ASSOCIATED WITH PERSISTENCE/ RECURRENCE?

P512

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Purpose/Background: The goal of anal fistula treatment is to obtain complete healing while preserving anal continence. In that sense, Ligation of the Intersphincteric Fistula Tract (LIFT) is an attractive technique that preserves sphincter anatomy. The success rate of this approach has been reported between 47 to 94%. This retrospective study reports our institutional experience with the technique and analyses possible variables associated with LIFT failure.

Methods/Interventions: All patients operated for anal fistula from January 2013- September 2018 were identified using electronic medical record (EMR). Charts were reviewed and all patients that underwent LIFT were included. All surgeries were performed by residents under the direct supervision of 5 Board Certified Colorectal Surgeons in two hospital centers (NYU Langone Health and Bellevue Hospital). Information regarding demographics, fistula characteristics, surgery, surgical outcomes, and recurrence was collected. Patients were considered to have a persistence/recurrence if fistula in ano was evidenced after surgery in the original location

by treating surgeon. Statistical analysis was performed with Fisher exact and ANOVA tests. Significance was set at 0.05.

Results/Outcome(s): Sixty-six patients were included in our study, the mean age was 42 years (20-81) and 47 patients (71.2%) were male. The mean time between fistula diagnosis and surgery was 176 days and patients referred symptoms for a mean time of 16 months before diagnosis. Fifty patients (75%) underwent operative seton placement in preparation for LIFT, mean time between seton placement and LIFT was 179 (35-687) days. Thirty-eight patients (57%) had previous anorectal procedures other than seton placement. Fistula characteristics are depicted in table 1. Thirty-eight (57%) of patients had the internal orifice at the posterior midline. No intraoperative or immediate postoperative complications were recorded. All procedures were ambulatory, jackknife position was used in 59 cases (89%), mean operative time was 34 min (9-85min) and mean estimated blood loss was 6ml (1-30ml). Ligation of the fistula tract was performed with braided polyglactin suture in all cases; 3-0 sutures in 33 patients (50%), 2-0 in 26 patients (39%) and 0 in 6 patients (9%). With a mean follow up (FU) time of 261 days, 24 patients (36%) presented recurrence/persistence of anorectal fistula. The mean time for recurrence was 213 days. Seventeen of these patients (70%) underwent surgical treatment for recurrence. Recurrence was not associated with posterior midline internal orifice (41.7 vs. 58.3%, $p=0.79$), preoperative seton placement (38 vs. 31.3%, $p=0.77$), previous anorectal surgery (37.9 vs. 35.1%) and type of suture used for tract ligation ($p=0.3$). No evidence was found in the EMR of clinically significant fecal incontinence/soiling during follow-up.

Conclusions/Discussion: In our experience LIFT is a quick operation, performed in the ambulatory setting in all cases with minimal morbidity and good clinical outcomes. The procedure was successful in 64% of the cases and most of the recurrences were treated surgically. Posterior fistulas, previous anorectal surgeries, type of absorbable suture used for tract ligation and preoperative seton placement were not associated with recurrence

P512 Fistula Characteristics

External Orifice Location	n (%)
Lateral Anterior	37 (56.1%)
Lateral Posterior	15 (22.7%)
Lateral	10 (15.2%)
Posterior Midline	2 (3%)
Anterior Midline	1 (1.5%)
Horseshoe	1 (1.5%)

PERIOPERATIVE OUTCOMES OF BASCOM CLEFT LIFT FOR PILONIDAL DISEASE: A SINGLE-CENTER RETROSPECTIVE REVIEW.

P513

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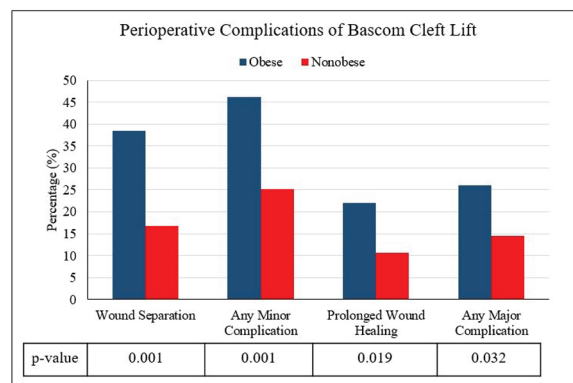
Purpose/Background: The Bascom cleft lift has become increasingly popular since its first introduction, yet a paucity of quality data exists regarding procedural outcomes. The purpose of this study was to determine the perioperative outcomes for the Bascom cleft lift in a single-center cohort.

Methods/Interventions: We performed a retrospective review of all patients at our institution that underwent a Bascom cleft lift for pilonidal disease from 2013 to 2018. Patient-specific characteristics including age, gender, BMI, prior surgical procedures for pilonidal disease, and comorbidities (including diabetes, hypertension, cigarette smoking, etc.) were recorded, as were select operative details (specifically usage of a closed suction drain). Postoperative complications were categorized as major or minor. Major complications were defined as return to the operating room (ROR; for surgical drainage or revision), need for negative pressure wound therapy (wound VAC dressing), and prolonged wound healing (failure of wound to heal at 3 months post-operative follow up). Minor complications were defined as wound separation, hematoma, seroma, and surgical site infection (managed as an outpatient with oral antibiotics alone/drainage in clinic). Recurrence (>3 months following documented healing) and time to healing were also recorded. Univariate and multivariate regression analysis was performed to determine the association between patient-specific and operative characteristics and post-operative complications, recurrence, and time to healing.

Results/Outcome(s): We identified a total of 235 patients that met the inclusion criteria. The mean age was 27±11 years, and the majority of patients were male (67.1%). The average patient was obese with a mean BMI of 30.6, and 24.3% (57) of patients were active smokers. Overall, 43% (101) of patients had previously undergone incision/drainage, 15.7% (37) had undergone prior surgical excision, and a small minority (1.3%, 3) had undergone prior flap procedure (Bascom, Limberg, etc.) for pilonidal disease. Most patients (94%, 221) had a drain placed as part of their surgery. The overall rate of minor complications was 34.5% (81), and the rate of major complications was 19.1% (45). The majority of minor complications were wound separation (26.4%, 62), followed by seroma (5.1%, 12), infection (3.0%, 7), and hematoma (2.5%, 6). The majority of major complications were composed of prolonged wound healing (15.7%, 37), followed by ROR (9.8%, 23), and negative pressure wound therapy (3.0%, 7). Recurrence occurred in 11 patients (4.7%). Mean time to healing was 8.9±10.7 weeks. Mean follow up was 43

weeks. Obesity was associated with higher rates of minor complications (46% v. 25%, $p<0.001$), principally due to higher rates of wound separation (39% v. 17%, $p<0.001$). Obesity (BMI≥30) was also associated with higher rates of major complications (26% v. 15%, $p<0.021$), predominantly as a result of higher rates of prolonged wound healing (22% v. 10%, $p<0.019$). On multivariate regression analysis (adjusting for age, gender, prior surgical procedure, select comorbidities, and use of closed suction drain), obesity remained an independent risk factor for minor complication (OR 2.5, $p=0.003$) and major complication (OR 2.2, $p=0.031$). Prior flap procedure was the only other significant risk factor for major complication according to this analysis (OR 16.9, $p<0.032$). Smoking was not a significant risk factor for wound-related issues.

Conclusions/Discussion: The most important risk factor for perioperative complications following Bascom cleft lift procedure is obesity. Obese patients should therefore be appropriately counseled regarding their increased risk prior to surgery.



FISTULA LASER CLOSURE (FILAC™) FOR FISTULA-IN-ANO - YET ANOTHER TECHNIQUE WITH 50% HEALING RATES?

P514

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Purpose/Background: Treatment of ano-cutaneous fistulas remains a therapeutic challenge balancing the chance of permanent closure with the risk of incontinence. Several sphincter-sparing techniques have been introduced with promising results initially. Unfortunately, the long-term outcomes are typically not as reassuring. Fistula Laser Closure (FiLaC™) is a relatively new technique for treatment of ano-cutaneous fistulas. Early results have been encouraging, but the external validity needs to be verified. The aim of this study was to determine the success rate of complete fistula-in-ano closure using the laser technique. Secondary endpoints included adverse events and patient characteristics associated with treatment success.

Methods/Interventions: This was a retrospective cohort study of consecutive patients subjected to FiLaC™ at Digestive Disease Center, Bispebjerg Hospital, University of Copenhagen, between March 2017 and June 2018. All patients had a one-track fistula not suitable for lay open because of a significant risk of faecal incontinence. All were treated with a draining seton for at least 8 weeks prior to laser closure. Fistulas were classified using endoanal ultrasound (EAUL). Patients were operated in general anesthesia, and the fistula was ablated with a 360 degree emitting 12-watt 1470 nm laser probe. The inner fistula opening was closed with a single stitch absorbable suture, whereas the outer opening was excised. All patients were followed with clinical examination including EAUL at 2 weeks, 3 and 6 months.

Results/Outcome(s): In total, 38 patients were included. One patient had a high intersphincteric; 12 had low transsphincteric; 22 high transsphincteric and 3 had suprasphincteric fistulas. The median duration of symptomatic fistulas before the FiLaC™ procedure was 694 days (IQR 301 – 1726 days) and for seton drainage, 18 weeks (IQR 12 – 45 weeks). Five patients had Crohn's disease and were in relevant biological treatment. Median follow up was 256 days (IQR 192 – 322 days). Six patients (15.8%) had a repeated laser ablation as the fistula persisted after the first procedure. Ultimately, the rate of complete closure was 53% (n = 20) at the end of follow-up. Two of the six patients subjected to a repeated procedure had fistula closure. Two patients (5%) with treatment failure developed an abscess following the procedure and two patients experienced pain necessitating an examination in general anesthesia, one of whom actually had persistent fistula closure. No patients suffered from incontinence.

Conclusions/Discussion: Fistula closure with laser ablation had success rates comparable to that of other available sphincter-sparing techniques. The technique seems safe with respect to adverse events and with no risk of incontinence. Patients may have repeated laser treatments, which will increase healing in some of the patients with healing failure after the initial procedure.

PUSHING THE ENVELOPE IN ENDOSCOPIC SUBMUCOSAL DISSECTION – IS IT FEASIBLE AND SAFE IN SCARRED LESIONS?

P515

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Purpose/Background: Endoscopic submucosal dissection (ESD) is an established advanced polypectomy technique to manage large colorectal polyps. We aimed to evaluate those patients who had ESD in the setting of significant scarring due to a previous intervention to determine if this approach is safe & feasible.

Methods/Interventions: Patients who underwent ESD over the previous 14 months were identified from an IRB approved prospectively maintained database. Data points analyzed included polyp size, location, pathology, previous polyp intervention, morbidity & mortality and length of stay. Those patients who had significant scarring documented at ESD were compared to those who did not. Statistical tests employed included Mann-Whitney U & Kruskal Wallis.

Results/Outcome(s): Ninety one patients had ESD between 08/2017 – 10/2018 with median polyp size 31.5mm (range: 20 – 45mm, SD: 19.5). Twenty two cases were carried out in the operating room (OR) as they were expected to be technically challenging & to possibly require combined endoscopy & laparoscopic surgery (CELS) & 69 in endoscopy. Nine patients (9.89%) were confirmed as having significant scar making the ESD more technically difficult. In the scarred group 7 had at least one prior EMR, 1 had a previous snare & 1 had biopsy only. In the non-scarred group 47 had previous biopsy, 2 had snare & 2 had EMR. There were significantly more previous EMRs in the scarred group (p<0.001). Significantly more of the scarred patients had their ESD in the OR versus endoscopy (p<0.001). The number of clips placed was not different between the scarred (median 2) & non-scarred (median 2) group (p=0.6). An over the scope clip (Ovesco) was used in a greater number of scarred cases. There were three patients who had CELS, two were in the scarred group (p=0.6). The 30-day morbidity rate was 17.6% (16/91) (Table 1). There were no mortalities. There was one morbidity in the scarred group which was a perforation and was managed non-operatively (bowel rest, intravenous antibiotics & serial physical examinations). Overall there were five perforations, three were managed non-operatively and were diagnosed on day zero. Two perforations required surgical intervention, one on day zero & the other on day one. The patients (n=6) who had PR bleeding were managed conservatively. The majority of patients had a day-case procedure. 7/9 (78%) of the scarred patients stayed overnight for observation & were discharged home well the following day. The overall readmission rate was 6.67% - three patients were readmitted with abdominal pain with no perforation, three with PR bleeding and one with colonic perforation which required surgical intervention.

Conclusions/Discussion: Not only is ESD in patients who have scarred lesions technically feasible and safe, it avoids a bowel resection in the majority of patients who have exhausted other advanced endoscopy techniques. It is reasonable to perform ESD on these patients in the OR to allow early operative intervention if required.

TREATMENT STRATEGIES FOR CRYPTOGLANDULAR TRANSSPHINCTERIC ANAL FISTULA: A COST-EFFECTIVENESS ANALYSIS.

P516

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Purpose/Background: Treatment of transsphincteric anal fistula with significant sphincter muscle at risk can have detrimental impact on healthcare utilization and quality of life. The surgical management of complex transsphincteric anal fistula is challenging and failure is common. Sphincter-sparing procedures may help to decrease fecal incontinence and impaired quality of life related to anal sphincter compromise. Several surgical techniques exist to repair a transsphincteric anal fistula with variable healing rates, changes in continence and the frequent need for multiple procedures. The aim of this study is to determine the relative cost-effectiveness of available techniques to address transsphincteric anal fistulas with significant sphincter muscle at risk.

Methods/Interventions: A Markov decision analytic model was developed to compare cost and effectiveness of treatment strategies for transsphincteric anal fistula of cryptoglandular origin including ligation of the intersphincteric fistula tract (LIFT), endorectal advancement flap (Flap) and Staged fistulotomy over a

36 month period from initial surgery. Associated state transition probabilities of healing, recurrence patterns, and Quality Adjusted Life-Years (QALY) were based on expert consensus, literature review and a retrospective institutional database. Health care utilization cost were based on Centers for Medicare and Medicaid Services (CMS) data. Primary outcomes of cost-effectiveness analysis (CEA) included accrued cost, QALY, net-monetary benefit (NMB) and incremental cost-effectiveness ratios (ICERS). A one-way sensitivity analysis for a varying probability of transsphincteric recurrence after LIFT was used to analyze the effect of this parameter on the outcomes. A probabilistic sensitivity analysis (PSA) using 10,000 sampled patient outcomes based on healed fistula distributions of 0.65 +/- 0.06 for LIFT and Flap and 0.85 +/- 0.08 for staged fistulotomy was used to assess the effect of second order variability on the model.

Results/Outcome(s): CEA shows cost effectiveness in QALY and NMB for LIFT (\$5,841/2.80QALY/\$134,297), Flap (\$7,598/2.76 QALY/\$130,200) and Staged fistulotomy (\$8,125/2.49 QALY/\$116,597). CEA shows greater residual value for the LIFT strategy at a willingness to pay (WTP) of \$50,000. ICERS show LIFT to be the dominant strategy over both flap (-\$37,547/QALY) and Staged fistulotomy (-\$7,407/QALY). One-way sensitivity analysis shows the LIFT strategy with transsphincteric recurrence less than 87% to be the dominant strategy over endorectal advancement flap and staged fistulotomy. When LIFT

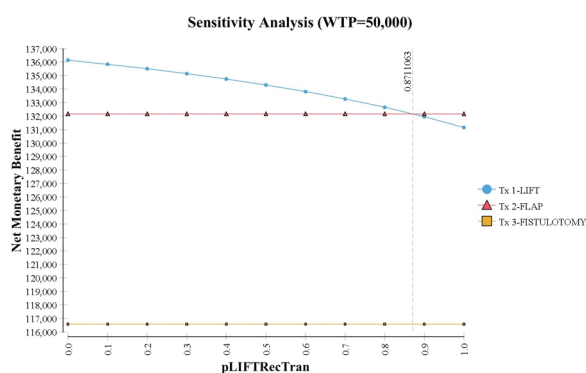
P515 Table 1. Comparing ESD in scarred to non-scarred polyps

	Scarred (n=9)	Not scarred (n=82)	P value
Location			0.803
Cecum	2	28	
Ascending	1	12	
Transverse	2	15	
Sigmoid	4	14	
Rectum	0	12	
Pathology			0.098
Tubular villus adenoma	5	22	
Tubular adenoma	4	42	
Sessile serrated	0	7	
Invasion	0	7	
High grade dysplasia	4	24	0.415
Use of clips (yes/no)	7	39	0.069
Morbidity			0.457
Perforation	1	4	
PR bleeding	0	6	
Abdominal Pain	0	3	
Other*	0	3	
Size (median mm, range SD)	35 (19-85, SD 20.4)	30 (15-50, SD 10.9)	0.986

*Other = nausea & vomiting (n=1), delirium (n=1), diarrhea (n=1)

results in a transsphincteric recurrence in greater than 87% of cases, flap becomes the dominant strategy over both LIFT and staged fistulotomy (Figure 1). PSA shows the optimal strategy is LIFT in 86% and Flap in 14% of patients (N=10,000) samples and Staged fistulotomy is never preferred over LIFT or Flap with NMB of \$132,910+/-2,149, \$126,271+/-11,502 and \$116,634+/-8,807 for LIFT, Flap and Staged fistulotomy, respectively.

Conclusions/Discussion: Transsphincteric anal fistula benefits from sphincter preserving procedures in order to reduce cost and maximize quality of life. This state transition model finds LIFT is the most cost-effective procedure for treatment of a complex transsphincteric anal fistula. LIFT provides the best cost to retained quality of life ratio and overall greater NMB for transsphincteric recurrence less than 87%. This suggests that the benefit of the LIFT procedure is due, in great part, to decreased transsphincteric recurrence compared to flap and to preserved quality of life compared to staged fistulotomy when significant anal sphincter muscle is at risk.



MUCOPEXY-RECTO ANAL LIFTING (MURAL) PROCEDURE FOR OBSTRUCTED DEFECATION SYNDROME CAUSED DUE TO RECTAL INTUSSUSCEPTION.

P517

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Purpose/Background: Rectal intussusception is one of the causes of obstructed defecation syndrome. The patients complain of unsuccessful evacuation attempts or feeling of incomplete evacuation or of the requirement to apply intense pressure for evacuation. Conservative treatments, such as dietary control or biofeedback therapy are the first-line treatment, but the success rate is low. The symptoms of obstructed defecation may be experienced because redundant rectal mucosa may occlude the anal canal lumen; therefore, applying additional strain does not alleviate the symptoms, but worsens them. Considering this etiology, the procedures in which the redundant rectal

mucosa is sutured or resected would provide relief. Stapled transanal rectal resection (STARR) is one such procedure in which the redundant mucosa is resected using double circular stapler device. The reported success rate is as high as approximately 90%, but serious complications, such as recto-vaginal fistula or rectal stenosis at the stapled site are reported. Mucopexy-Recto Anal Lifting (MuRAL) is a mucohemorrhoidopexy procedure originally reported by Pagano et al. as a minimally invasive procedure for hemorrhoids in which the rectal mucosa juxta-proximal to the hemorrhoids is sutured. The redundant rectal mucosa causing intussusception might be eliminated by performing this procedure; however, to date, there has been no report indicating this procedure for rectal intussusception. Here, we report our initial results for the MuRAL procedure for rectal intussusception.

Methods/Interventions: Between September 2017 to July 2018, 10 patients with rectal intussusception underwent the MuRAL procedure. Written informed consent was acquired from all patients before surgery. The cohort consisted of 6 males and 4 females, and the average age of the patients was 72.1 years. The following standardized surgical procedure was used: With the patient in the lithotomy position, a rotating surgical proctoscope is inserted into the anus. The first mucosal suture starts at 11 o'clock (right anterior) location with the whip stitch at the lower mucosal edge of the operating window and advances towards the proximal side with the mucosal whip stitch followed by an ascending running suture every 2–4 mm. The running suture must involve the mucosa and submucosa to ensure subsequent fibrosis. Finally, the two ends of the thread are tied up, and mucopexy at one location is completed. Similar sutures are placed at other 5 locations, i.e. left anterior (1 o'clock) location, left and right lateral (3 and 9 o'clock) locations, and left and right posterior (5 and 7 o'clock) locations, to ensure involvement of entire rectal circumferential.

Results/Outcome(s): Six out of 10 patients reported complete resolution of their symptoms, and 3 patients reported partial recovery. Only 1 patient did not recover and continued biofeedback treatment. Postoperative bleeding occurred in 2 patients; neither of them required surgical care for hemostasis. No other complication occurred. Although the observation period was short, no patient reported recurrence.

Conclusions/Discussion: In our experience, although the observation period is short, the MuRAL procedure provided excellent results for rectal intussusception. Since this is a preliminary study and has many limitations, it cannot provide any concrete recommendations; therefore, additional studies with longer observation periods and more patients are warranted.

COLECTOMY OUTCOMES IN THE ELDERLY WITH INFLAMMATORY BOWEL DISEASE.

P518

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Purpose/Background: Elderly patients (65 years or older) often have inferior outcomes compared to their younger counterparts after major abdominal operations. There are especially limited data regarding surgical outcomes in elderly patients with inflammatory bowel disease (IBD), which is important for pre-operative decision making. We sought to utilize a national database to examine the outcomes after a colectomy in the elderly with IBD.

Methods/Interventions: We queried the 2016 NSQIP Targeted Colectomy Database to identify patients that underwent a colectomy with an associated diagnosis of either Crohn's Disease (CD) or Ulcerative Colitis (UC). Patients were categorized by age (<65 years vs. 65 or older). Variables were compared between the two groups using univariate analysis. Primary outcomes were 30-day morbidity, defined as having any complication, and 30-day mortality. Multivariate analysis was performed to derive independent predictors of 30-day morbidity and 30-day mortality.

Results/Outcome(s): We included 9,996 patients in the study: 7,297 (73.0%) with CD and 2,699 (27.0%) with UC. Of these patients, 8,769 (87.7%) were less than 65 years and 1,227 (12.3%) were 65 years or older. Gender distribution was similar between the groups (52.1% males in elderly vs 49.1%, $p = 0.42$). Within the elderly cohort, there was a higher proportion of white patients (85.0% vs 80.9%, $p < 0.001$) and patients with UC (40.2% vs 25.2%, $p < 0.001$). Elderly patients also had a higher rate of diabetes (16.1% vs 3.5%, $p < 0.001$), dyspnea (7.1% vs 2.2%, $p < 0.001$), functional dependence (4.6% vs 0.7%, $p < 0.001$), COPD (7.4% vs 1.0%, $p < 0.001$), HTN (55.9% vs 13.0%, $p < 0.001$), renal failure (1.1% vs 0.1%, $p < 0.001$), bleeding disorders (7.4% vs 2.8%, $p < 0.001$), and pre-operative sepsis (10.8% vs 5.2%, $p < 0.001$). Elderly patients had a higher proportion of emergent cases (17.8% vs 8.2%, $p < 0.001$). Both age groups had a similar distribution of the type of colectomy: 356 (29.0%) total colectomy in elderly vs 2337 (26.7%) in the younger group ($p = 0.08$). There was no difference in the proportion of clean-contaminated cases (59.8% vs 59.9%, $p = 0.96$). Elderly patients had an overall higher rate of ASA Class 3 or greater (70.4% vs 40.2%, $p < 0.001$). The mean [SD] length of stay was also higher for elderly (11.3 [10.5] vs 9.0 [9.6], $p < 0.001$). In terms of discharge destination, elderly patients had a lower proportion discharged home (76.0% vs 96.9%, $p < 0.001$). Regarding post-operative complications, elderly patients have an increased incidence of ileus (25.3% vs 16.2%, $p < 0.001$), pneumonia (5.3% vs 1.6%, $p < 0.001$), reintubation (4.0% vs 1.0%, $p < 0.001$), renal failure (1.5% vs

0.3%, $p < 0.001$), urine infection (3.3% vs 1.6%, $p < 0.001$), blood transfusion (19.5% vs 9.8%, $p < 0.001$), septic shock (6.4% vs 1.7%, $p < 0.001$), and cardiac arrest (1.0% vs 0.2%, $p < 0.001$). There is no difference in the rates of anastomotic leaks (3.3% vs 4.2%, $p = 0.13$), superficial SSI (5.5% vs 5.4%, $p = 0.88$), deep SSI (1.4% vs 1.2%, $p = 0.55$), and organ/space SSI (6.1% vs 7.7%, $p = 0.05$). There is also no difference in c. difficile infection (0.6% vs 0.5%, $p = 0.84$) and 30-day readmission (14.0% vs 13.5%, $p = 0.59$). Elderly patients do have a higher rate of morbidity (34.8% vs 21.6%, $p < 0.001$) and mortality (4.8% vs 0.4%, $p < 0.001$). Multivariate analysis showed that elderly patients have a significantly increased incidence of both morbidity (OR 1.36, 95% CI: 1.14-1.64, $p < 0.001$) and mortality (OR 3.41, 95% CI: 1.99-5.85, $p < 0.001$). Most significant independent predictors of morbidity in all patients include pre-operative renal failure (OR 4.93, 95% CI: 1.30-18.75, $p = 0.02$), pre-operative sepsis (OR 3.77, 95% CI: 2.99-4.76, $p < 0.001$), functional dependence (OR 2.51, 95% CI: 1.51-4.15, $p < 0.001$), and emergent status (OR 1.48, 95% CI: 1.21-1.79, $p < 0.001$). A minimally invasive approach (OR 0.62, 95% CI: 0.49-0.78, $p < 0.001$), mechanical bowel prep (OR 0.72, 95% CI: 0.62-0.83, $p < 0.001$), oral antibiotic prophylaxis (OR 0.84, 95% CI: 0.72-0.97, $p = 0.02$), and a higher pre-operative albumin level (OR 0.60 95% CI: 0.55-0.65, $p < 0.001$) all decreased the odds for morbidity. Most significant independent predictors for mortality include ascites (OR 6.19 95% CI: 2.31 – 16.63, $p < 0.001$), pre-operative sepsis (OR 2.86, 95% CI: 1.61-5.08, $p < 0.001$), emergent status (OR 2.82 95% CI: 1.55-5.11, $p < 0.001$), and ASA Class 3 or greater (OR 2.74, 95% CI: 1.11-6.77, $p = 0.03$). A higher pre-operative albumin level (OR 0.53, 95% CI: 0.38-0.73, $p < 0.001$) and a diagnosis of CD (OR: 0.33, 0.18-0.61, $p < 0.001$) decreased the odds of mortality.

Conclusions/Discussion: Elderly patients with IBD that undergo a colectomy are at increased risk for both morbidity and mortality. Better understanding of the unique risk to this group of patients will lead to better pre-operative discussions regarding care. Optimizing these patients may reduce the risk, but further prospective trials are warranted to further elucidate the ideal optimization strategies.

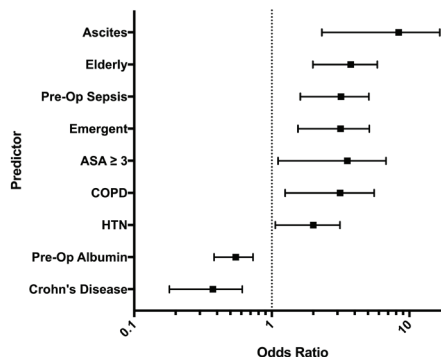


Figure: Predictors for mortality after a colectomy in patients with inflammatory bowel disease.

FACTORS ASSOCIATED WITH READMISSION AFTER CROHN'S ILEOCOLECTOMY.

P519

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Purpose/Background: No studies have specifically evaluated causes of readmission in patients after ileocelectomy done for Crohn's disease. We evaluated clinical, operative, and laboratory factors to identify which were associated with short term (less than 30 days) readmission in patients with Crohn's disease who undergo ileocelectomy.

Methods/Interventions: We performed a retrospective review of 269 Crohn's patients who underwent 287 ileocelectomies between July 2008 and October 2018 and had been prospectively recruited into our Colorectal Diseases Biobank. ICD9 and 10 codes were used to determine the cause of readmission as necessary. Surveyed clinical characteristics included sex, race, family history, history of prior ileocelectomy, age, BMI and smoking status at surgery, whether surgery was open, laparoscopic, or converted, emergent, urgent, or elective, whether diverting ostomy was performed, and length of stay after surgery. Preoperative use of biologics, immunomodulators, prednisone, and intravenous steroids were also evaluated. Finally, the last white blood cell count (WBC), hematocrit (Hct), and albumin from the index admission (prior to discharge) were documented for each surgery. Statistical analysis was performed using Fisher exact, Chi squared, and Student's t-tests as appropriate.

Results/Outcome(s): Of the 287 ileocelectomies evaluated, there were 31 readmissions (11%) including 2 reoperations (0.7%). Causes for readmission were dehydration (11 patients), anastomotic leak and/or intra-abdominal abscess (5 patients), wound complications (5 patients), venous thromboembolism (3 patients), small bowel obstruction or ileus (3 patients), clostridium difficile infection, incarcerated inguinal hernia, failure to thrive, and shortness of breath from pleural effusion (1 patient each). Six of the 11 patients readmitted due to dehydration had a diverting ostomy proximal to the ileocolic anastomosis. Two patients with anastomotic leak required radiologic guided drainage and an additional patient required return to the OR for drainage and diverting loop ileostomy. A comparison of the readmissions group to the no readmissions group is presented in the attached table. The average length of stay was the same between the readmission and no-readmission groups although the median was higher in the readmissions group at 5 days vs 4 days. Patients requiring readmission more frequently underwent open or laparoscopic converted to open surgeries and the placement of a diverting stoma. Patients in the readmissions group also had lower hematocrit and serum albumin levels immediately prior to discharge than patients in the no readmissions group. Though not statistically different, the readmissions group more often had an abnormally elevated WBC on discharge. Of note, there was no difference in

preoperative biologic, immunomodulatory or steroid use between the two groups.

Conclusions/Discussion: Our study found a readmission frequency of 11% after ileocelectomy in this relatively higher risk group of patients that compares favorably with the literature for colorectal procedures in general. The statistically significant factors associated with readmission included open or laparoscopic converted to open ileocelectomy, presence of a diverting ostomy, and lower discharge hematocrit and albumin. These operative and laboratory values should be considered when determining readmission risk at the time of patient discharge after ileocelectomy.

DIFFERENCES IN PERIOPERATIVE FACTORS AND SURGICAL OUTCOMES BETWEEN CROHN'S DISEASE AND ULCERATIVE COLITIS IN PEDIATRIC PATIENTS.

P520

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Purpose/Background: The incidence of pediatric inflammatory bowel disease (IBD) is approximately 10 per 100,000 children in the United States. Unfortunately, this trend is rising not only in our country but in the industrialized world. With a prevalence of about 150 per 100,000 children in the United States, most pediatric surgeons can expect to see several children with IBD in their practices. We aimed to identify differences in the outcomes and complications of pediatric patients undergoing intestinal surgery for Crohn's disease (CD) and ulcerative colitis (UC).

Methods/Interventions: We examined cases with a diagnosis of CD or UC from 2014, 2015, and 2016 in the American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) Pediatric database. The cases were selected based on the diagnosis of UC or CD, and then further analyzed based on relevant procedures. Demographic data, preoperative factors, and operations were analyzed for significant differences between the CD and UC groups. Additionally, each group was further divided to analyze the factors contributing to post-operative complications within each cohort.

Results/Outcome(s): A total of 1134 cases were selected from the pediatric NSQIP database, and 447 CD cases and 482 UC cases were analyzed. The UC cohort had more males and a lower average age compared to the CD group. The UC group also had an increased rate of steroid use, hematologic disorder, preoperative transfusions, systemic inflammatory response syndrome (SIRS), and unplanned reoperation (Table). On the other hand, the CD cohort had an increased rate of open wounds with or without wound infection and sepsis compared to the UC group (Table). Preoperative transfusions, steroid use, and hematologic disorders significantly increased the

risk of developing post-operative complications in the UC group, while no factors significantly increased the risk of developing post-operative complications in the CD group.

Conclusions/Discussion: Even though CD and UC belong to the same IBD family, these diseases have clear differences. Analysis of demographic and perioperative characteristics of the pediatric IBD population showed that steroid use was more common in UC patients and furthermore increased incidence of complications in those patients. We believe that surgeons have to be aware that pediatric UC patients who have been on steroid treatments will have a greater risk for postoperative complications. Another factor for surgeons to consider is that there are significant risk factors that contribute to post-operative complications within the UC cohort, but no significant

risk factors that contribute to post-operative complications within the CD cohort. Based on these findings, we believe it would be advantageous for surgeons to especially optimize UC patients needing preoperative transfusions, on steroid treatments, or with hematologic disorders prior to surgery.

TABLE

Complication	CD (n=477)		UC (n=482)		p-value
Sepsis	21	4.40%	8	1.66%	0.0131
Open wound/Wound infection	19	3.98%	5	1.04%	0.0035
Steroid use	137	28.72%	176	36.51%	0.0101
Hematologic Disorder	81	16.98%	114	23.65%	0.0103
Preop transfusions	9	1.89%	28	5.81%	0.0016
SIRS	18	3.77%	36	7.47%	0.0131
Unplanned reoperation	23	4.82%	51	10.58%	0.0008

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	Readmissions n=31	No Readmissions n=256	p-value
Sex	-	-	0.4
Male	16 (52%)	113 (44%)	
Female	15 (48%)	143 (56%)	
Caucasian	28 (90%)	240 (94%)	0.6
Family history	11 (35%)	81 (32%)	0.7
History of prior ileocelectomy	11 (35%)	79 (31%)	0.7
Smoking at surgery	10 (32%)	61 (24%)	0.3
Age at surgery (mean +/- SE)	40.6 +/- 2.6	37.5 +/- 0.8	0.2
BMI at surgery (mean +/- SE)	25.1 +/- 1.1	25.8 +/- 0.4	0.6
Type of surgery	-	-	0.04*
Open	19 (61%)	108 (42%)	
Laparoscopic	8 (26%)	128 (50%)	
Laparoscopic converted to open	4 (13%)	20 (8%)	
Timing of surgery	-	-	0.3
Elective	23 (74%)	217 (85%)	
Urgent	7 (23%)	32 (13%)	
Emergent	1 (3%)	7 (3%)	
Diverting ostomy	13 (42%)	52 (20%)	0.01*
Length of stay after surgery (days, mean +/- SE)	-	-	1
(days, median)	6.7 +/- 0.9	6.9 +/- 1.5	
(days, median)	5	4	
Biologic use	14 (45%)	132 (52%)	0.8
Immunomodulator use	7 (23%)	64 (25%)	0.5
Prednisone use	17 (55%)	124 (48%)	0.5
IV steroid use	11 (35%)	64 (25%)	0.2
WBC (mean +/- SE)	12.0 +/- 0.9	10.7 +/- 0.2	0.07
Hct (mean +/- SE)	32.1 +/- 1.0	34.1 +/- 0.3	0.02*
Albumin (mean +/- SE)	3.0 +/- 0.1	3.2 +/- 0.03	0.01*

RISK FACTORS FOR COMPLICATIONS AFTER ABDOMINAL SURGERY IN CROHN'S DISEASE.

P521

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Purpose/Background: Abdominal surgery for Crohn's disease demands a multidisciplinary approach, since there are many factors that influence the outcomes, such as nutritional status, immunosuppression, surgical technique, patient's age and comorbidities. The aim of the study was to assess the risk factors for surgical complications after abdominal surgery for Crohn's disease, especially the impact of immunosuppression.

Methods/Interventions: A retrospective analysis was made from a cohort of patients undergoing abdominal surgery for Crohn's disease from 2012-2018. Preoperative data regarding patient's age, Montreal classification of Crohn's disease, medications in use, comorbidities, activity of the disease (assessed by symptoms and C-reactive protein), nutritional status (assessed by serum albumin, haemoglobin and necessity of preoperative nutritional optimization), and type of surgery were obtained from medical records. For postoperative complications, those occurring during the first 30 postoperative days were included.

Results/Outcome(s): A total of 104 abdominal surgeries for Crohn's disease were performed during the period in 92 patients – 45% women, 12,5% laparoscopic, 71,3% elective and 78,8% with anastomosis. The mean age was 40,6 years and 40,4% of the surgeries were the first abdominal surgery of the patient. The rate of surgical complications was 25%, being half of them related to the abdominal wound and the other half, anastomotic dehiscence or surgical site infection. Regarding immunosuppression, 34,5% of the patients were receiving either infliximab (22%) or adalimumab (12,5%), 5,7% were receiving immunosuppressor + corticosteroid, 12% immunosuppressor + immunomodulator (azathioprine or methotrexate) and 8,6%, immunosuppressor + corticosteroid + immunomodulator. The patients were under immunosuppression for an average of 100 weeks (minimum 5, maximum 288 weeks; average of 117 weeks in the adalimumab group and 88 weeks in the infliximab group). On univariate analysis, immunosuppression, either with infliximab or adalimumab, combined or not with corticosteroid and/or immunomodulator was not significantly associated with surgical complications, with the relative risk (RR) of these therapies varying from 0 to 1,2 ($p>0,05$). Serum albumin $<3,5$ g/dL, C-reactive protein >30 and haemoglobin <10 g/dL were associated with increased risk of postoperative complications, with RR of 1,4, 1,8 and 1,8, respectively, but with no statistical relevance ($p>0,05$). Use of corticosteroids, Montreal classification and type of surgery (urgent versus elective and first versus second surgery or more) were also not associated with increased risk for complications. The only

factor significantly associated with increased risk for postoperative surgical complications was time of disease >10 years (RR= 2,26, $p=0,018$).

Conclusions/Discussion: Immunosuppression with infliximab or adalimumab was not associated with increased risk for complications after abdominal surgery for Crohn's disease, either alone or combined with corticosteroids or immunomodulators. Surprisingly, not even use of corticosteroids was associated with higher risk of complications, maybe because a higher proportion of patients in this group received nutritional optimization before surgery when compared with the group that was not receiving corticosteroid (40% against 25%). Lower levels of serum albumin and haemoglobin were also not significantly associated with increased risk, probably because these patients routinely receive intense nutritional optimization preoperatively in our service. The only statistically significant risk factor for surgical complications was time of disease >10 years, maybe suggesting that surgery should not be delayed in patients with Crohn's disease.

COMPLICATIONS OF ILEOSTOMY CLOSURE AFTER ILEAL POUCH-ANAL ANASTOMOSIS (IPAA): IT'S NOT WHAT YOU MAY THINK.

P522

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Purpose/Background: The Ileal-Pouch Anal Anastomosis (IPAA) is a common procedure for patients with severe, refractory Ulcerative Colitis. The goal of this study was to assess complications following loop ileostomy closure in patients after pouch creation at our institution, as well as report a relatively common presentation of SIRS with no identifiable source following ileostomy closure.

Methods/Interventions: Our department IPAA database was queried for all patients who underwent 3-stage IPAA creation from 2011 through 2018 for pertinent clinical information regarding their procedures and outcomes. All data was reviewed and analyzed using the SPSS application.

Results/Outcome(s): 378 charts were queried. 68 complications (18.0% of cases) were identified after ileostomy closure. 37 cases were small bowel obstruction or partial small bowel obstruction (SBO or pSBO, 9.79%), 5 cases of leak from ileoileostomy anastomosis (7.4%), and 4 cases of leak from pouch (5.9%). There was no significant difference in time between restorative proctocolectomy with IPAA and loop ileostomy closure with cases where a complication occurred and where one did not ($p=0.28$). 16 patients developed a SIRS response in the first 5 days after surgery and without an identified intra-abdominal source after extensive work-up. 33% of these patients also had negative re-explorations (both open and laparoscopic). None required re-diversion, and all recovered well with supportive care.

Conclusions/Discussion: While obstruction remains the most common complication following ileostomy closure, a surprisingly large number of presents present with a SIRS response with no identifiable source. All of these patients recovered with supportive care and none required further intervention or diversion. This is a poorly understood phenomenon which is unique to ileostomy closure after IPAA and further study is required.

DOES THE POSTOPERATIVE INFLAMMATION IN J POUCH AND ANAL CANAL NEED TREATMENT IN ULCERATIVE COLITIS PATIENTS WITH POUCH SURGERY? HISTORICAL EXAMINATION AND NEW TREATMENT WITH BUDESONIDE FOAM POUCHITIS.

P523

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Purpose/Background: Standard operation for ulcerative colitis(UC) are ileal pouch anal anastomosis with rectal mucosectomy(IPAA) and stapled ileal pouch anal anastomosis(SIPAA) with preserved anal canal mucosa. There is certain degree of inflammation in pouch including pouchitis and anal canal mucosa after surgery. It is important to know the degree of inflammation and whether treatment is necessary or not. Histological examination in J pouch and preserved anal canal mucosa was performed by endoscopy and new treatment with budesonide foam for pouchitis were evaluated in this study.

Methods/Interventions: 1) Of 1129 UC patients with surgery, 499 patients with postoperative endoscopic examination for J pouch or anal canal were included in this study (IPAA 15, SIPAA 484). Endoscopic examination with biopsy was performed 657 sets in 499 patients (1 set: biopsy in the upper, middle, lower pouch and 3 parts of anal canal). Histological grading underwent for pouch inflammation (no: normal, mild: slight aggregation of neutrophil with plasma cells, moderate: moderate aggregation of neutrophil with preservation of mucosa, severe:severe aggregation of neutrophil with destruction of mucosa)and for anal canal by Matts grading. 2) Treatment with budesonide foam(2 times/day) underwent for 17 pouchitis patients with modified PDAI (mPDAI) \geq 5. Median duration of treatment was 14 days(13-42). Effectiveness was defined to be both mPDAI $<$ 5 and decrease of \geq 2 mPDAI after treatment.

Results/Outcome(s): 1) Pouch inflammation: No inflammation was found in 12%, mild in 60%, moderate in 23% and severe in 5%. Anal canal mucosa: Matts grade 1 inflammation was found in 0.5%, grade 2 in 69%, grade 3 in 29%, grade 4 in 1%, grade 5 in 0.5% and no patients were required treatment because of mostly mild to moderate inflammation and small lesion. 2) With budesonide foam for pouchitis, mPDAI decreased from 6.9

to 3.5 in average with statistical significance. Effectiveness was found in 41%. Diarrhea was seen in one patient just after first use of budesonide foam.

Conclusions/Discussion: Almost all the ulcerative colitis patients with pouch surgery had a certain degree of inflammation in the pouch which was mostly mild or moderate without the necessity of treatment. Treatment for the inflammation in the anal canal was not also required because of mostly mild to moderate inflammation. Treatment with budesonide foam for pouchitis has not reported yet. It is suggested that budesonide foam is alternative treatment for pouchitis because of high effective rate with good retention in the inflamed pouch in this study.

INFLIXIMAB DOES NOT IMPAIR ANASTOMOTIC HEALING IN A MOUSE MODEL.

P524

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Purpose/Background: TNF-a antagonists are a mainstay of treatment for patients with Crohn's disease (CD). The reported impact of these agents on key outcomes such infectious complications and anastomotic leak has been remarkably inconsistent and confounded by key selection factors. We aimed to assess the impact of infliximab (IFX) on anastomotic healing in a mouse model of colon resection.

Methods/Interventions: Balb/c mice underwent an exploratory laparotomy, colon resection, and primary anastomosis. Experimental groups were treated with 10 mg/kg of IFX intraperitoneal (IP) for 8 weeks prior to surgery, whereas control animals were given normal saline. On postoperative day 7 (POD), the animals were sacrificed and the anastomosis was assessed using our validated healing score (1= minor adhesions, 2= dense adhesions, 3 = abscess, 4 = frank leak). The anastomosis was sent for histology with Tunnel staining as a marker of epithelial apoptosis and poor intestinal healing. Because we have previously associated anastomotic leak with compositional and functional changes of the microbiome colonizing anastomotic tissue, in a subset of animals, anastomotic tissue on POD7 was excised, homogenized and further analyzed: (1) Total bacterial community- To determine how the entire bacterial community changes with IFX administration, microbial DNA was extracted from the homogenite and PCR of the 16S rRNA V4-5 region was performed and sequenced by Illumina HiSeq4500 platform. (2) Bacterial collagenase- Because we have shown that collagenolytic organisms can degrade healing anastomotic tissue resulting in anastomotic leak, we assayed the homogenites for the presence of collagenolytic bacteria.

Results/Outcome(s): There was no difference in the anastomotic healing score between those animals treated with IFX and control animals (Figure 1A). Representative

images of minor adhesions and abscess formation (Figure 1B). Histology results with apoptosis tunnel staining demonstrated an increase in epithelial apoptosis in animals given IFX, consistent with its known effect. Phenotype analysis of bacterial communities associated with anastomotic tissue showed no difference in the amount of collagenolytic organisms between control animals and those treated with IFX. 16S rRNA analysis showed emergence of *Turicibacter* in mice treated with IFX. This bacterial community pattern has been shown to be a probiotic and is increased in TNF^{-/-} mice.

Conclusions/Discussion: Infliximab did not promote the emergence of collagenolytic bacteria or impair anastomotic healing in a mouse model of colon resection and anastomosis. This supports clinical data suggesting the safety of IFX in patients undergoing bowel resection.

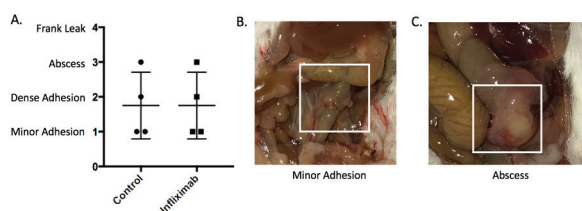


Figure 1: A) Anastomotic healing score demonstrating no difference between treatment groups. B) Representative images of minor adhesions and abscess formation.

LAPAROSCOPIC-ASSISTED SURGERY FOR COMPLEX CROHN'S DISEASE: IS IT REALLY BENEFICIAL?

P525

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Purpose/Background: Crohn's disease (CD) patients are often young and undergo many surgeries during their lifetime. Though the use of laparoscopy in general CD population is widely studied in the literature, the role of laparoscopy is not well-defined for the complex CD cases which include fistulizing, abscess forming or obstructive disease. In this study, we aimed to compare the perioperative outcomes of the laparoscopic-assisted surgery to their open surgery counterparts in a propensity score-matched analysis. We hypothesized that the postoperative complication rate of the laparoscopic-assisted surgery would be better than that of open surgery cohort in complex CD surgery.

Methods/Interventions: We queried an IRB-approved institutional database to include patients who had undergone surgeries for complex CD (fistulizing, obstructive or intra-abdominal abscess) from 2005 to 2017. Patients who had perianal fistulas, ambulatory surgeries, stoma closures without a bowel resection were excluded from the study. Propensity score matching was used to match laparoscopic to open cases on a 1:1 basis. A logistic regression model was

used to assign a propensity score to each patient using the laparoscopic approach as the outcome and age, BMI, gender, steroid use (yes vs. no vs. unknown), indication (fistula vs. abscess vs. SBO), ASA classification (1-2 vs 3-4) and previous abdominal operation as the independent variables.

Results/Outcome(s): A total of 1021 patients were identified, of whom 227 (22.2%) had laparoscopic surgery and 794 (77.8%) had open surgery. Mean age was 34.5 years, 113 (49.8%) of the patients were male, 104 patients (45.8%) had previous abdominal operations, and 171 patients underwent surgery for fistula (75.8%), 33 patients for obstruction (14.5%), and 22 patients for abscess (9.7%). Four hundred and fifty-two patients (226 in the laparoscopic and 226 in the open group) were included in the propensity-score matched analysis. Patients in the laparoscopy-assisted group had a shorter median disease duration (5 vs. 12 years, $p < 0.001$), shorter length of stay (6 vs. 8 days, $p < 0.001$) and a shorter median operative time (145.5 vs. 171 minutes, $p = 0.009$) compared with their open surgery counterparts. The laparoscopic-assisted group had 91 patients (40%) with at least one postoperative complication whereas the open group had 97 patients (43%). Propensity score-matched logistic regression analysis showed no difference in terms of postoperative complications (Odds ratio: 0.90 [95% CI 0.62, 1.3], $p = 0.57$). Thirty patients had conversions to open surgery (13.8%). Median incision length in the laparoscopic group was 4 centimeters (IQR 1, 6).

Conclusions/Discussion: Laparoscopic-assisted surgery does not confer advantages to open surgery in terms of postoperative complications, but decreases the length of stay after surgery for complex CD. The role of laparoscopy should be evaluated for each individual patient.

SEASONAL AND REGIONAL ANALYSIS OF CROHN'S DISEASE AND ULCERATIVE COLITIS: DO TRENDS EXIST?

P526

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Purpose/Background: We have previously reported on seasonal and regional trends for diverticulitis. Two other important diseases that have significant impact on a large patient population are Crohn's disease (CD) and ulcerative colitis (UC), which have not been studied in this context. In this study, we analyze the monthly and regional trends for CD and UC based on the National Inpatient Sample (NIS) database.

Methods/Interventions: Utilizing the 2008-2016 NIS database, we identified patients with CD (555.X/K50.X) and UC (556.X/K51.X) using ICD-9-CM and ICD-10-CM codes. Cases were assigned to specific months based on the admission month (AMONTH) found in the NIS database. We adjusted for annual and monthly variations of patient

admissions by converting raw monthly case numbers into monthly average rate of cases per 100,000 admissions. We also assigned cases to the 4 major regions, West, Midwest (MW), Northeast (NE), and South, based on the hospital ID and hospital region (HOSP_REGION).

Results/Outcome(s): Based on the 9 years of NIS data analyzed, there were 359,649 CD patients and 209,266 UC patients. Approximately 96% of the patients had admission month information in the NIS database for both patient populations. A clear seasonal trend was observed for both CD and UC admission rates with the highest rates during the summer months of July and August and lowest rates during the winter months of January and February (Figure 1a and 1d). We also observed a steady increase in the number of CD and UC cases during the 9-year period (Figure 1b and 1e). The regional analysis shows an increasing regional distribution of CD patients (Figure 1c) from West (18.91%, $p<0.001$), South (24.02%, $p=0.011$), NE (27.98%, $p<0.001$), to MW (29.09%). An increasing regional distribution of UC patients (Figure 1f) from South (20.50%, $p<0.001$), West (24.14%, $p<0.001$), MW (25.55%, $p=0.263$), to NE (29.81%, $p<0.001$) was also observed.

Conclusions/Discussion: Based on this current review of the NIS database for CD and UC patients, the same seasonal trend was observed as the seasonal trends for diverticulitis patients that we have previously reported. Interestingly, we noted a steady increase of patients admitted with CD and UC during our 9 year study period. There was also a clear regional trend observed for both CD and UC patients. Our current study lends further support for a strong environmental etiological component to these diseases.



Figure Description: Figure 1. 2008-2016 NIS (a) Average Monthly Rate, (b) Annual Trend of Monthly Rate, and (c) Annual Case Distribution by Region for Crohn's disease, and (d) Average Monthly Rate, (e) Annual Trend of Monthly Rate, and (f) Annual Case Distribution by Region for ulcerative colitis. Dotted blue line is the 4th degree polynomial trend line for (a) and (d) and linear trend line for (b) and (e).

MESENTERY PLEXITIS RELATED REFRACTORY PAIN WITH MINOR FINDINGS DURING LAPAROSCOPY: IMPORTANCE OF PREOPERATIVE DIAGNOSTIC WORKUP TO GUIDE RESECTION.

P527

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Purpose/Background: Biologics use for Crohn's disease patients is widespread. Dramatic clinical, radiological and endoscopic remission may occur, but few cases are still sent to surgery for absence of response or persistence of a given symptom. In those cases with partial response the intraoperative findings may be minor and may confound the Surgeon decision if the timeline based analysis of the previous exams findings has not been taken into consideration. Mesentery plexitis has been associated with recurrence and its clinical diagnosis may be difficult, depending on time of evolution of the disease and previous treatments.

Methods/Interventions: To illustrate this not so rare condition we present the case of a 26 yrs woman, previous 2 c-sections, who was submitted to a laparoscopic ileocolic resection for failure of medical therapy. In the 9 months from the beginning of the symptoms to the resection she was submitted to MRI (2 times), Ileocolonoscopy (2 times), blood tests, fecal tests (calprotectin) and microbiological testings. All exams showed improvement of the inflammatory damage in the terminal ileum and systemic inflammation as well. Main symptom at the diagnosis was abdominal pain and diarrhoea and after 2 biologics tested in the 9 months, the patient kept the abdominal pain as the most limiting feature of the disease, with recurrent admissions and treatment based on fasting periods and anti-spasmodic medications. Such refractory and persistent symptom led to the indication for surgery. Submitted to laparoscopic evaluation minimal findings could be found at inspection, but taking into consideration the previous exams, in which localized ileal thickening and ulcers were found, an ileocecal resection was performed and a side to side intracorporeal laparoscopic anastomosis conducted.

Results/Outcome(s): After the surgery the main complain was solved and histological features of inflammatory disease with, granulomas and plexitis in the mesentery confirmed Crohn's disease.

Conclusions/Discussion: Conclusion: Mesentery plexitis may be responsible for pain and, depending on chronicity and previous medication, its findings during laparoscopic or open surgery may be not realized by the surgeon leading to insuccess of the surgical intervention in treating the patient. Partial clinical remission to biologics may lead to an almost complete radiological or endoscopic response and this condition may culminate in

an inconclusive intra-operative inspection. The surgeon must guide the intra-operative decision based on the comparison and timeline analysis of the previous exams and persistency of symptoms to decide for intestinal resection in such cases.

PELVIC POUCH EXCISION: THE TORONTO EXPERIENCE.

P528

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Purpose/Background: Restorative proctocolectomy with ileal-pouch anal anastomosis (IPAA) is the procedure of choice for most patients with ulcerative colitis or FAP requiring surgery. While the majority have a successful outcome, approximately 10% of patients experience long-term pouch failure. There is limited data regarding outcomes following surgery and trends in pouch failure and excision rates over time. As the prevalence of IPAA's increase with time, it is projected that the number of excisions will also rise. In view of this, the objective of this study was to evaluate short-term and long-term complications and intervention rates following pouch excision and to describe trends in pouch survival and excision rates over time.

Methods/Interventions: The Mt. Sinai Hospital IBD database was used to identify patients undergoing pelvic pouch excision between 1981 -2018. In total 154 patients underwent excision during the study period. Patient demographics, pouch characteristics and time to failure as well as preoperative, and postoperative variables were abstracted from the medical record. Post excision follow up data was available for 140 patients. Descriptive analysis was performed as appropriate. Linear regression was used to describe change in pouch excision volume over time. Kaplan – Meier curves were constructed to estimate pouch survival over time. A log-rank test was used to compare different staged approaches. All analyses were performed using Stata (Version13.1, StataCorp).

Results/Outcome(s): Patient demographics, indications for resections, short/long term complications and final pathology in the post excision cohort are shown in table 1. The median age at time of pouch excision was 44 (19-74). 74 (52.9%) patients were men, 54 (38.6%) had a pre-operative diverting ileostomy and at time of excision 13 (9.3%) and 7(5%) patient were receiving biologic and steroids respectively. The majority of pouches were constructed at Mt Sinai Hospital, for ulcerative colitis, with stapled anastomosis and in a J-configuration. Pouch revision was attempted in 28 patients prior to excision.

Septic complications were the most common indication for surgery (22.9%). In the cohort 3 patients underwent excision with a known diagnosis of Crohn's disease while a further 39 underwent surgery for pouch-perineal/vaginal abscess or fistula. SSI (30.7%) and ileus (28.6%) were the most common early post operative complications. Non-healing perineal wounds were the most frequent long term complication (24.3%). Re-admission and re-operation rates were 9.9% and 2.9%. 47 patients (34%) underwent 61 long term intervention related to the pouch excision of which most were for perineal wound complications. On final pathology 114 specimens were in keeping with inflammation or pouchitis. Six cases had a suspicion of Crohn's disease on final pathology. Across the entire cohort median time to excision was 5.92 (IQ range 2.41 – 11.3). Probability of pouch survival at 25 years was 92% (CI 90-93%) with a median pouch observation time of 17 years (IQ range 9 - 24years). There was no association between staged approaches and pouch survival ($p=0.21$). A significant increase in pouch excisions performed per year was observed (annual increase of 0.6 pouch excision/year, $p=0.014$).

Conclusions/Discussion: The pouch survival rate in our study was consistent with other expert high-volume centers. The increase in pouch excision volume per year reflects the growing prevalence of patients with IPAA's. While a significant number of patients underwent excision for fistulous disease, the pathological diagnosis of Crohn's in our cohort was low reflecting the difficulty in making this diagnosis in the setting of IPAA. This study represents one of the first to define long term re-intervention rate following pouch excision. Overall, 33.6% of patients required re-intervention directly related to complications of pouch excision surgery with perineal wound indications being most common. With increasing prevalence of pouch excision, the observed complication rates in our study highlight the importance of appropriate patient counseling prior to surgery. Further study is required to clarify patient quality of life, the use of negative-pressure wound dressings in this patient population, and the appropriate selection of patients for diversion alone vs. pouch excision for IPAA failure.

Table 1:	N = 140	%
Patient Demographics		
Men	74	52.9
Biologics Prior To Surgery	13	9.3
Steroids Prior To Surgery	7	5
Diverting Ileostomy Prior to OR	54	38.6
Indication for Excision:		
Sepsis	32	22.86
Pouchitis	19	13.57
Function	31	22.14
Crohns Disease	3	2.14
PV Fistula	19	13.57
Neoplasm	3	2.14
Perianal Disease	20	14.29
Emergency/Other	13	9.29
Pathology at Excision		
Suspicion of Crohns Disease	6	4.37
Chronic Inflammation	85	62.04
Pouchitis	29	21.16
Neoplasm	4	2.92
Other	13	9.48
Short Term Complications		
Surgical Site Infection	43	30.71
Ileus	40	28.57
SBO	8	5.71
Intra-abdominal Abscess	13	9.29
GU Complication	13	9.29
Post Operative Transfusion	20	14.29
Readmission	13	9.29
Reoperation	4	2.86
Long Term Complications		
Recurrent Small Bowel Obstruction	16	11.43
Chronic Perineal Wound	34	24.29
High Output Ileostomy	12	8.57
Ventral Hernia	11	7.86
Parastomal Hernia	13	9.29
Sexual Dysfunction	5	3.57
Chronic Pain	8	5.71
Home IV Replacement	2	1.43
Long Term Re-intervention		
Number of Patients Requiring OR:	47	33.57
Number of Patients with multiple ORs:	12	8.57
Number of Procedures Total:	61	
Individual Case Counts		
Perineal Wound (EUA/Excision Sinus/ Gracilis)	25	40.98
Stoma Revision	16	26.22
Hernia (Abdominal /Parastomal)	14	22.95
SBO	2	3.27
Laparotomy + SB resection	3	4.92
Abdominal Wall Wound	1	1.64

Table 1. Patient demographics, Pathological findings, Short-term and Long-term Complications

PREDICTORS OF REOPERATION FOLLOWING COLECTOMY FOR INFLAMMATORY BOWEL DISEASE.

P529

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Purpose/Background: In the United States, it is estimated that 1.3 million individuals suffer from inflammatory bowel disease (IBD), and the majority of these patients are diagnosed in the second or third decade of life. Up to 50% of patients with Crohn's disease and ulcerative colitis will require bowel resection within ten years of diagnosis. Many of these patients are on steroids or immunomodulators, which have been shown to increase the risk

of postoperative complications. One such complication, reoperation, has been increasingly used as a metric for surgical quality. The aim of this study is to determine the risk factors associated with reoperation following colectomy in patients with inflammatory bowel disease.

Methods/Interventions: The American College of Surgeons Colectomy-Specific National Surgical Quality Improvement Program database (2016) was used to identify patients who underwent colectomy for Crohn's disease or ulcerative colitis. The primary outcome was the 30-day reoperation rate and secondary outcomes were preoperative predictors of reoperation. Bivariable and multivariable analyses were conducted to assess risk factors for reoperation.

Results/Outcome(s): A total of 2,712 patients were identified. 146 patients (5.4%) underwent reoperation. The median time to reoperation was seven days (IQR: 4-14). Multivariable analysis revealed that higher ASA physical classification (OR: 2.0, 95%CI: 1.4-2.9, $p < 0.001$), preoperative sepsis (OR: 2.0, 95%CI: 1.3-3.2, $p = 0.004$), preoperative steroid use (OR: 1.5, 95%CI: 1.003-2.2, $p = 0.048$) and preoperative weight loss (OR: 1.6, 95%CI: 1.0-2.6, $p = 0.03$) were independent risk factors for reoperation after colectomy for IBD. In terms of specific reoperations performed, 19.9% of patients underwent exploratory laparotomy, 17.1% of patients underwent colectomy, and 6.8% of patients underwent ostomy revision or creation. The most common reason for reoperation was anastomotic leak (36%, 52 patients).

Conclusions/Discussion: We have identified specific preoperative risk factors associated with reoperation after colectomy for IBD. Interventions that target these modifiable preoperative risk factors may help to reduce reoperation rates in this surgical population.

SURGICAL OUTCOMES IN LOW VOLUME VERSUS HIGH VOLUME CENTERS FOR ULCERATIVE COLITIS: A SYSTEMATIC REVIEW.

P530

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Purpose/Background: To date there have been no systematic reviews that have explored the effect of hospital volume on surgery for ulcerative colitis. Whereas pelvic pouch surgery is, in certain jurisdictions, referred to high volume centres, emergency surgery for ulcerative colitis is often performed in centres of variable volume by necessity. It is imperative to understand the impact of hospital or surgeon volume in all surgery for ulcerative colitis to ensure delivery of care is optimized in this arena. The purpose of this study was to determine whether an

association between hospital/surgeon volume and surgery for ulcerative colitis exists.

Methods/Interventions: We searched Medline, Embase and the Cochrane Central Register of Controlled Trials from 1946/47-February 13, 2018. Studies that explored the effect of hospital or surgeon volume on outcomes in surgery for inflammatory bowel disease were included. Main outcome measures included 30-day mortality, length of stay, readmission rates, reoperation rates, ileal pouch-anal anastomosis (IPAA) excision rates, and postoperative complications.

Results/Outcome(s): A total of 2817 relevant articles were retrieved and assessed by the search strategy, and 7 met the inclusion and exclusion criteria. Data from these studies could not be combined secondary to heterogeneity regarding definitions of surgeon and/or hospital volume. Four of these studies specifically investigated outcomes in the ulcerative colitis population. Two studies demonstrated higher postoperative mortality in low and medium volume hospitals when compared to high volume hospitals. Adjusted odds ratios for low volume and medium volume hospitals were 2.42 (95%CI, 1.26-4.63) and 2.02 (95%CI, 1.02-4.01) compared to high volume hospitals respectively; this association held true in the setting of emergency colectomy for acute colitis. Unsurprisingly, the studies that explored outcomes following IPAA demonstrated an association between volume and pouch excision rates, with adjusted odds ratios for excision reported as high as 4.06 (95% CI, 1.33-12.42) in low volume centers compared to high volume centers. In the same vein, hospital readmission rates have been demonstrated to be significantly higher in low volume centers for IPAA surgery when compared to high volume centers.

Conclusions/Discussion: The association between volume and surgical outcomes in the setting of ulcerative colitis is an important consideration, especially in the setting of emergency surgery. While some studies have demonstrated improved outcomes in high volume institutions, more studies are ideally required to combine data in a meta analytic fashion to develop the most robust appreciation of this relationship.

ROBOTIC VS. LAPAROSCOPIC COLECTOMY FOR DIVERTICULITIS: A CASE-MATCHED ASSESSMENT OF SHORT-TERM OUTCOMES.

P531

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Purpose/Background: Up to twenty percent of patients with diverticulitis will ultimately require surgical resection. In recent years, robotic-assisted surgery (RAS) has played an increasing role in the elective management of diverticular disease. It is unclear if the benefits ascribed to RAS

have translated to improvements in short-term outcomes as compared to traditional laparoscopic surgery (LAP). We hypothesized RAS and LAP would result in similar 30-day perioperative outcomes with longer operative times in the RAS cohort.

Methods/Interventions: We performed a retrospective review of the American College of Surgeon's National Surgical Quality Improvement Program Colectomy Procedure Targeted Database (NSQIP C-PTD) from 2013 – 2017. NSQIP C-PTD provides 30-day outcomes data and reports the operative approach of all included cases. Patients identified as having undergone laparoscopic (pure laparoscopic or laparoscopic with open assist) or robotic (pure robotic or robotic with open assist) segmental colectomy with primary anastomosis for diverticular disease were selected. All ICD-9 and ICD-10 codes for diverticular disease of the large intestine were included. Exclusion criteria included emergent cases, non-elective cases, ASA classification of 5, postoperative diagnosis other than diverticular disease, planned formation of an ostomy, or concurrent resection of other intra-abdominal organs. 13,504 unique patients were identified [RAS=2,072 (15.3%), LAP=11,432 (84.7%)]. Demographic, intraoperative, and postoperative variables were compared across the entire cohort. RAS cases were then case-matched based on year of operation, ASA classification, BMI, age, and sex. Of the original 2,072 RAS cases, 22 were excluded due to inability to appropriately match, resulting in 2,050 pairs. A secondary analysis of case-matched data was performed. Categorical variables were compared with Chi-Squared and Fischer's exact tests as appropriate. Continuous variables were analyzed with independent samples t-tests. All analyses were performed using SAS software version 9.4 (SAS Institute Inc., Cary, NC). $P < 0.05$ was considered statistically significant.

Results/Outcome(s): Case-matched data is summarized in table 1. Case-matching did not produce significant alterations in baseline demographics or distribution of medical comorbidities from the entire study population. In both RAS and LAP, patients were more often female, majority Caucasian, were on average overweight, middle-aged, and with similar incidence of smoking, diabetes, congestive heart failure, and hypertension. RAS patients were more often Caucasian ($P=0.027$) and had a lower incidence of COPD ($P=0.036$). Method of bowel preparation was similar between RAS and LAP ($P=0.086$) with over half in each cohort undergoing combined mechanical and oral antibiotic bowel preparation. Similar proportions of RAS and LAP patients underwent an open-assisted technique (841 (41.0%) vs. 901 (43.9%), $P=0.60$). Operative times were longer in the RAS cohort (214 ± 77 vs. 183 ± 77 minutes, $P < 0.001$). RAS inserted fewer ureteral stents (210 (10.24%) vs. 291 (14.2%), $P < 0.001$), mobilized the splenic flexure less frequently (786 (38.34%) vs. 1051 (51.27%), $P < 0.001$), and required conversion to open surgery less often (88 (4.29%) vs. 174 (8.49%), $P < 0.0001$). Overall, rates of infectious (117 (5.71%) vs.

136 (6.63%), $P=0.22$), cardiovascular (7 (0.34%) vs. 12 (0.59%, $P=0.25$), and renal complications (10 (0.49%) vs. 4 (0.2%), $P=0.11$) were similar. RAS and LAP had no significant difference in need for transfusion (34 (1.66%) vs. 29 (1.41%), $P=0.53$), or rate of prolonged ileus (74 (3.61%) vs. 94 (4.59%), $P=0.12$), anastomotic leak (35 (1.71%) vs. 46 (2.25%), $P=0.22$), return to operating room (70 (3.14%) vs. 59 (2.88%), $P=0.33$), discharge to home (2027 (98.97%) vs. 2019 (98.63%), $P=0.31$), and 30-day readmission (114 (5.56%) vs. 119 (5.81%), $P=0.74$).

Conclusions/Discussion: In a case-matched series of 4,100 patients undergoing elective segmental colectomy for diverticulitis, both LAP and RAS approaches appear feasible and safe. However, these data suggest RAS reduces the need for conversions to open surgery and may decrease length of stay at the expense of longer operative times. RAS should be selectively considered for operative management of diverticulitis in the elective setting, especially when the surgeon's ability to complete the case laparoscopically is in question.

THE IMPACT OF OBESITY ON OUTCOMES OF PROCTECTOMY FOR CANCER: MORBID OBESITY IS ASSOCIATED INCREASED RISK OF SUPERFICIAL SURGICAL SITE INFECTION AND COMPOSITE MORBIDITY BUT NOT ANASTOMOTIC FAILURE.

P532

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Purpose/Background: Prior efforts evaluating obesity as a potential risk factor for postoperative complications following proctectomy have been limited by sample size and uniform outcome classification.

Methods/Interventions: The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) procedure targeted proctectomy database was queried to identify patients who underwent elective proctectomy for adenocarcinoma using open and

P531 Table 1. Results of Case-Matched Analysis

	Laparoscopic (N=2,050)	Robotic (N=2,050)
Sex		
Male, N (%)	927 (45.2%)	927 (45.2%)
Female, N (%)	1123 (54.8%)	1123 (54.8%)
Race		
White, N (%)	1753 (92.3%)	1840 (94.2%)*
African American, N (%)	114 (6.0%)	99 (5.1%)
Other, N (%)	32 (1.7%)	13 (0.7%)
Age, Years \pm SD		
Age \geq 65, N (%)	57.3 \pm 11.5	57.3 \pm 11.5
	570 (27.8%)	576 (28.1%)
BMI, Kg/M² \pm SD		
BMI \geq 30, N (%)	29.7 \pm 5.8	29.8 \pm 5.9
	856 (41.8%)	886 (43.2%)
Intraoperative Data		
Ureteral Stent Placement, N (%)	291 (14.2%)	210 (10.24%) [†]
Open-Assist Technique, N (%)	901 (43.9%)	841 (41.0%)
Mobilization of Splenic Flexure, N (%)	1051 (51.27%)	786 (38.34%) [†]
Conversion to Open, N (%)	174 (8.49%)	88 (4.29%) [†]
Operative Operative Time, Minutes \pm SD	183 \pm 77	214 \pm 77 [†]
Postoperative Data		
Total Length of Stay, Days \pm SD	4.1 \pm 2.7	3.7 \pm 2.4 [†]
Return to OR, N (%)	59 (2.88%)	70 (3.14%)
Anastomotic Leak, N (%)	46 (2.25%)	35 (1.71%)
Blood Transfusion, N (%)	29 (1.41%)	34 (1.66%)
Ileus, N (%)	94 (4.59%)	74 (3.61%)
30-Day Readmission, N (%)	119 (5.81%)	114 (5.56%)

All continuous variables are expressed as mean \pm standard deviation. * $P<0.05$, [†] $P<0.001$

minimally invasive techniques from 2016-2017. Patients were stratified by Body Mass Index (BMI) into normal weight (BMI 18.5-24.9 kg/m²), overweight (BMI 25-29.9), obese (BMI 30.0-34.9), and morbidly obese (BMI 35.0+) groups. Multivariable logistic regression models were built to compare outcomes for each cohort to those of patients with normal BMI adjusting for potentially confounding variables. Candidate independent covariates included age, race, comorbid conditions, preoperative chemotherapy or radiation, chronic steroid use, preoperative weight loss, procedure type and approach, presence of an entero-enteric anastomosis or proximal enteric diversion, ASA class, tumor location, operative time, and wound class. These variables were considered possible confounders if a univariate relationship revealed an association with each outcome at $p < 0.2$. Available 30-day outcomes evaluated included infectious complications, cardiorespiratory complications, wound complications, anastomotic leak, ileus, prolonged length of stay, mortality, and composite morbidity defined by development of any postoperative complication.

Results/Outcome(s): 2,241 patients met inclusion criteria: 748 (33.4%) had a normal BMI, 751 were overweight (33.5%), 472 were obese (21.2%), and 270 were morbidly obese (12.0%). Clinical stage, tumor location and procedure type were similar among cohorts. 49.9-54.6% of patients in each group underwent abdominoperineal resection ($p > 0.1$). On unadjusted analysis, increasing degrees of obesity were directly associated with increased median operative time: normal BMI, 258 min (IQR: 199-341); overweight, 286 min (IQR: 227-381); obese, 302 min (IQR: 229-387); morbidly obese, 324 min (IQR: 246-409), $p < 0.05$. The rates at which patients had a microscopic positive distal margin did not differ among BMI cohorts (1.5-2.5%, $p > 0.1$), but patients that were obese and morbidly obese has a lower risk of positive circumferential margins (5.5% and 4.1%) compared to patients with normal BMI (8.8%), $p < 0.05$. On unadjusted analysis, anastomotic leaks were observed in 5.9% overweight patients, 6.9% obese patients, and 4.7% morbidly obese patients compared to 6.9% in normal BMI patients, $p > 0.1$. On multivariable analysis, degree of obesity was associated with risk of superficial surgical site infection, risk of composite morbidity and risk of prolonged length of stay. Risk of superficial surgical site infection: overweight OR 1.67 [95% CI: 0.97, 2.90], obese OR 2.42 [95% CI: 1.36, 4.29], morbidly obese OR 3.29 [95% CI: 1.77, 6.11]. Risk of composite morbidity: overweight OR 1.03 [95% CI: 0.83, 1.28], obese OR 0.87 [95% CI: 0.67, 1.12], morbidly obese OR 1.44 [95% CI: 1.05, 1.96]. Risk of prolonged length of stay: overweight OR 0.95 [95% CI: 0.74, 1.21], obese OR 0.97 [95% CI: 0.73, 1.29], morbidly obese OR 1.58 [95% CI: 1.13, 2.22]. Obesity class was not associated with risk adjusted odds of anastomotic leak: overweight OR 0.93 [95% CI: 0.45, 1.91], obese OR 1.07 [95% CI: 0.48, 2.36], morbidly obese OR 0.88 [95% CI: 0.30, 2.5]. Male gender was the only independent predictor of anastomotic leak on adjusted modeling (OR 2.60 [95% CI: 1.30, 5.20]). Obesity class

was similarly not associated with risk of organ space SSI, wound dehiscence, postoperative ileus, other infectious or cardiopulmonary complications, bleeding requiring transfusion, return to operating room, readmission, or mortality.

Conclusions/Discussion: Morbid obesity is independently associated with an increased composite odds risk of short-term morbidity following elective proctectomy. This increased odds risk is driven primarily by increased risk of superficial surgical site infection. Obesity class did not demonstrate an association with anastomotic leak. Future quality efforts may be directed at more aggressive SSI prevention techniques for obese and morbidly obese patients undergoing oncologic proctectomy.

DOES THE ROUTINE ADDITION OF PREOPERATIVE IMMUNONUTRITION TO AN ENHANCED RECOVERY PROTOCOL IMPACT OVERALL POSTOPERATIVE MORBIDITY?

P533

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Purpose/Background: The use of preoperative immunonutrition among patients undergoing gastrointestinal surgery has been associated with reductions in infectious complication rates and length of stay. In the setting of an established enhanced recovery protocol after colorectal surgery, the influence of preoperative immunonutrition is unclear and high-risk subgroups in which immunonutrition may be most beneficial have yet to be fully defined. The objective of this study was to evaluate postoperative outcomes of patients undergoing elective colorectal surgery before and after the implementation of a preoperative immunonutrition protocol.

Methods/Interventions: Beginning in October 2017, all elective, major abdominal colorectal surgeries at a single institution were given an arginine-based immunonutrition supplement to be taken twice a day for five days prior to surgery. The control group consisted of elective cases within the same enhanced recovery protocol from the 3 years prior. The primary outcome was a composite of total overall morbidity using NSQIP defined postoperative outcomes. Sample size calculations were based on complication data from the control group. Subgroup analysis was based on preoperative nutritional status defined by the Prognostic Nutritional Index (PNI), with optimal cutoffs calculated a priori from the control group (< 31 being associated with a higher rate overall complications).

Results/Outcome(s): Two hundred and forty-two consecutive cases were prospectively followed and compared to 313 consecutive elective cases performed over the 3-year period prior to the study's implementation. Age ($p = 0.22$), sex ($p = 0.90$), ASA class ($p = 0.29$), BMI ($p = 0.36$) and number of co-morbidities ($p = 0.24$) did not differ between patients who received preoperative

immunonutrition and those who did not. Patients receiving preoperative immunonutrition when compared to patients who did not receive preoperative immunonutrition had a paradoxically higher proportion of overall complications (31% vs. 21%, $p=0.01$) and similar rate of surgical site infections (9.9% vs. 6.4%, $p=0.13$). Length of stay was statistically lower in the immunonutrition cohort (5 days vs. 5.5 days, $p=0.01$); however, there was a higher percentage of minimally invasive surgeries done in the immunonutrition cohort (64.7% vs. 79.7%, $p=0.03$). When stratifying for nutritional status, those receiving immunonutrition with a preoperative PNI <31 had similar rates of complications (33.9% vs. 38.6%, $p=0.10$) and surgical site infections (8.8% vs. 8.3%, $p=0.92$). Further subgrouping of patients based on the PNI also failed to demonstrate any statistically significant findings.

Conclusions/Discussion: Our results suggest that for patients undergoing major, elective colorectal surgery in an enhanced recovery setting, the addition of preoperative immunonutrition is of no discernable benefit. Though larger studies may be able to identify smaller differences in outcome, we were unable to detect a clinically significant change in outcomes even among those considered to be high-risk from a nutritional standpoint.

A NSQIP ANALYSIS OF TRENDS IN SURGICAL OUTCOMES FOR RECTAL CANCER: WHAT CAN WE IMPROVE UPON?

P534

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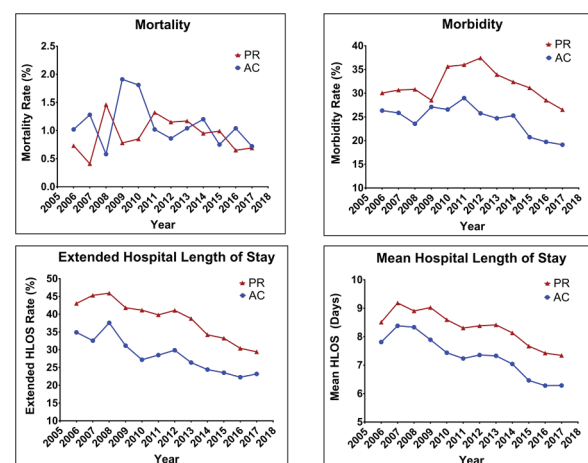
Purpose/Background: There is significant variation in rectal cancer outcomes in the USA, and reported outcomes have been inferior to those in other countries. In recognition of this fact, the American College of Surgeons (ACS) recently launched the Commission on Cancer National Accreditation Program for Rectal Cancer (NAPRC) in an effort to further optimize rectal cancer care. Large surgical databases will play an important role in tracking surgical and oncologic outcomes. Our study sought to explore the trends in surgical outcomes over the decade prior to the NAPRC using a large national database.

Methods/Interventions: The ACS National Surgical Quality Improvement Outcome (NSQIP) database from 2005-2017 was used to select colorectal cancer cases which were divided into abdominal-colonic (AC) and pelvic-rectal (PR) cohorts based upon the operation performed. Outcomes of interest were occurrence of any major surgical complication, mortality within 30 days of procedure and postoperative length of stay (LOS). Chi-square and two sample t-tests were used to evaluate association between various risk factors and outcomes. Modified Poisson regression was used to compare and estimate the

unadjusted and adjusted effect of procedure type on the outcomes. STATA 15.1 was used for analysis and statistical significance was set at 0.05.

Results/Outcome(s): A total of 34,159 patients were analyzed. AC cases constituted 50.7% of the overall cohort. The two groups were relatively similar in demographic distribution, but the PR patients had higher rates of hypoalbuminemia and were sicker (ASA class 3 or greater). Rates of non-sphincter preserving operations ranged from 30-34%. Higher complication rates in the PR cohort were mainly infectious and surgical site complications, while rates of deep vein thrombosis and pulmonary embolism were similar between the two cohorts. On bivariate analysis, rates of mortality were similar between the two groups (AC: 1.02% vs PR: 0.91%, $p=0.395$), while PR patients were found to be 1.36 times (95% CI: 1.32 - 1.41) more likely to have major complications and 1.40 times (95% CI: 1.35 - 1.44) more likely to have an extended LOS as compared to the AC patients. After multivariable analysis, PR patients continued to have higher likelihood of major complications (IRR: 1.31, 95% CI 1.25 - 1.36) and extended LOS (IRR: 1.38, 95% CI: 1.33 - 1.43). 10-year trends showed a significant reduction in the percentage of patients with prolonged lengths of hospitalization as well as a reduction of nearly 20% in the mean LOS, but without improvement in morbidity or mortality.

Conclusions/Discussion: Patients undergoing PR operations are more likely to have major complications than are patients undergoing AC procedures. Unfortunately no improvement in the rate of these complications or in mortality has occurred. Perhaps the significant reduction in length of stay is due in part to an increased prevalence of minimally invasive surgery and/or enhanced recovery protocols. Data were found to be lacking within NSQIP for several important variables including key oncologic data, stratification by surgical volume, and patient geographic location. We anticipate that the NAPRC should help improve PR surgical and oncologic outcomes including decreasing rates of morbidity and mortality during the next decade.



NSQIP Ten-Year Outcome Trends for Rectal Cancer: Mortality, Morbidity, Extended Hospital Length of Stay, and Mean Hospital Length of Stay. PR=Pelvic/Rectal Procedures, AC=Abdominal/Colonic Procedures.

TRENDS IN ROBOTIC COLORECTAL SURGERY: ANALYSIS OF THE ACS-NSQIP DATABASE FROM 2013-2017.

P535

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Purpose/Background: Since its introduction, robotic colorectal surgery has gained popularity. While numerous studies have investigated potential risks and benefits of robotic surgery, none have evaluated the trend of robotic use in colorectal surgery. The American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database added robotic assistance as a surgical approach in 2013. This study aims to analyze trends in robotic surgery compared to laparoscopy and open surgery over a five-year period using NSQIP data from 2013 to 2017.

Methods/Interventions: The ACS-NSQIP general and colectomy specific databases were queried for all colorectal procedures. These were categorized as robotic, laparoscopic, or open. Unplanned conversions to open were categorized separately. Colectomies performed using other approaches were excluded. The proportion of colorectal surgeries performed with robotic assistance was calculated for each year. Patients who underwent low pelvic surgery were identified by Current Procedural Terminology codes for coloproctostomy (44145, 44146, 44147, 44207, 44208). The proportion of low pelvic surgery performed using the robot was then calculated. Patients were categorized into groups by body mass index (BMI) (<18.5, 18.5 – 24.9, 25 – 29.9, 30 – 34.9, 35+) and American Society of Anesthesiology (ASA) classification (I-IV). The proportion of robotic cases performed per group was calculated for each year. The average operative times were calculated for each year.

Results/Outcome(s): A total of 147,804 colectomies were performed. Of these, 672 were excluded due to other approaches. 72,202 (49%) colectomies were performed laparoscopically, and 53,475 (37%) were performed using an open approach. 10,168 (6.4%) colorectal resections were performed robotically. 37,924 low pelvic resections were performed, of which, 20,196 (53%) were laparoscopic, 9,436 (25%) were open, and 4,659 (11%) were robotic. The percentage of laparoscopic resections each year remained stable at 48% - 50% each year, while number of open cases decreased from 40% to 33%. Conversely, the proportion of robotic colon resections rose annually, from 2.8% in 2013 to 9.4% in 2017 (Figure 1a). For low pelvic cases, the proportion of laparoscopic surgery ranged between 53%-55%, whereas the percentage of open cases decreased from 30% to 22%. For the low pelvic cohort, use of robotic surgery trended up from 5.9% in 2013 to 15.9% in 2017 (Figure 1b). Robotic resections were more commonly performed in the overweight and obese patients

(BMI 25-34.9) and in patients with moderate to severe comorbidities (ASA 2-3). Robotic approaches increased each year across all BMIs and ASA groups in the study period (Figure 1c-1d). The mean operative time for robotic colectomy (229 minutes) was longer than laparoscopic (175 minutes) or open (165 minutes). The length of surgery did not change significantly in any of the study groups throughout the study period. The overall rate of unplanned conversions from laparoscopic and robotic to open remained stable (7.2% - 8.1%).

Conclusions/Discussion: The majority of colorectal resections in the last 5 years of the ACS-NSQIP were performed through minimally invasive approaches. Open colectomy declined each year, while laparoscopic approaches remained stable. The greatest increase in any category for colorectal surgery comes through the adoption of robotic approaches. These encompass more complex patients based upon ASA and BMI. The expansion of robotic surgery appears to allow a greater proportion and more complex patients to receive minimally invasive surgery.

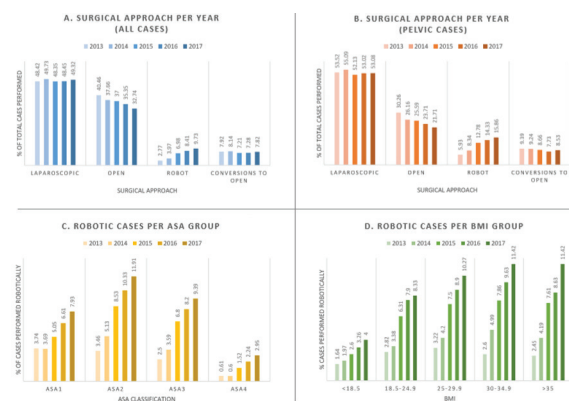


Figure 1. Trends in adoption of Robotic Platform between 2013-2017. 1a - Proportion of all cases performed each year per surgical approach. 1b - Proportion of low pelvic cases performed each year per surgical approach. 1c - Proportion of robotic cases performed each year per ASA classification. 1d - Proportion of robotic cases performed each year per BMI group.

COLECTOMY RATES IN COMPLICATED DIVERTICULITIS: USING A NOVEL METRIC TO EXAMINE HOSPITAL VARIABILITY IN THE ACUTE MANAGEMENT OF CONTAINED PERFORATIONS.

P536

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Purpose/Background: Though the incidence of diverticulitis in the U.S. has increased over the last 30 years, management has shifted away from surgery. Patients admitted acutely for complicated diverticulitis are most often able to be managed nonoperatively, particularly those with contained perforations or abscesses (Hinchey class I-II). We hypothesized that adoption of nonoperative

strategies for acute complicated diverticulitis varies across hospitals and that hospital colectomy rates may be associated with patient outcomes. Therefore, we examined adjusted hospital colectomy rates for acute complicated diverticulitis and the association of these rates with in-hospital mortality and length of stay.

Methods/Interventions: We used the Healthcare Cost and Utilization Project Florida State Inpatient Database to identify patients with a primary diagnosis of diverticulitis associated with a contained perforation requiring inpatient admission (2006-2014). Only patients admitted acutely through the emergency department were included. Contained perforations were defined as the presence of an intraabdominal, pelvic, or retroperitoneal abscess in the absence of gross peritonitis or fistula. Patients undergoing colectomy during index hospitalization were identified. Hospital-level adjusted colectomy rates were calculated using regression models accounting for differences in patient demographics, socioeconomic factors, and comorbidity burden. Hospitals were then categorized into quartiles based on adjusted colectomy rates. Hospital risk-adjusted inpatient mortality and lengths of stay were then compared across quartiles.

Results/Outcome(s): Of 14,128 patients with contained perforations treated acutely at 203 Florida hospitals, 4,492 (35%) underwent surgery. After adjusting for patient factors, operative rates varied widely across hospitals (median 34%; range 13-78%). High colectomy-rate hospitals had longer lengths of stay (8 days, IQR 5-12 v. 6 days, IQR 4-9, $p<0.01$) and higher risk-adjusted in-hospital mortality than low colectomy-rate facilities (0.56% v. 1.25%, $p<0.0001$).

Conclusions/Discussion: High colectomy-rate hospitals have higher in-hospital mortality and longer lengths of stay compared to hospitals with low colectomy rates for acute, complicated diverticulitis. We also found significant hospital variability in colectomy rates. Factors driving this variability remain unknown. Further examination of hospitals with a high colectomy rate for acute, complicated diverticulitis may change practice patterns and ultimately improve patient outcomes.

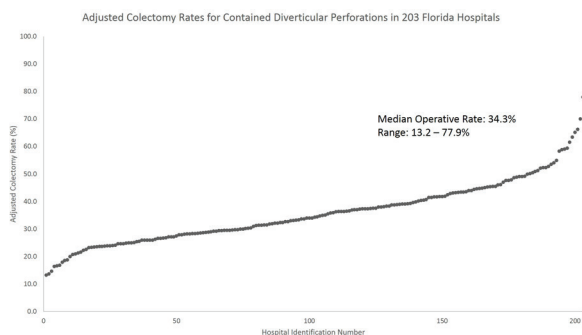


Figure 1. Adjusted colectomy rates (ACR) for contained perforations in 203 Florida hospitals. Each point represents a single hospital's colectomy rate, adjusted for their patient mix, including demographics, comorbid conditions, and socioeconomic factors. Median ACR: 34%; Range 13-78%

THE EFFECTS OF SURGICAL SPECIALTY ON ELECTIVE COLECTOMY OUTCOMES: SINGLE-INSTITUTION NSQIP ANALYSIS.

P537

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Purpose/Background: Several factors have been associated with reducing perioperative morbidity following colectomy. These include performing laparoscopic surgery, adopting fast-track protocols, and using mechanical and antibiotic bowel preparation. While high surgeon volume and specialization have been linked with superior outcomes for pancreatic, liver, aortic, and carotid operations, currently there are limited data evaluating and comparing colectomy outcomes based on surgical specialty. The purpose of this study was to investigate the impact of surgeon specialty on outcomes following elective colectomy.

Methods/Interventions: The data were obtained from our institutional American College of Surgeons National Surgical Quality Improvement Project (ACS-NSQIP) database. Elective colectomy cases from January 2010 through December 2017 were included in the analysis. For open colectomies, 44140, 44141, 44143, 44144, 44145, 44146, 44147, 44150, 44151, and 44160 current procedural terminology (CPT) codes were used, whereas 44204, 44205, 44206, 44207, 44208, and 44210 CPT codes were used for laparoscopic cases. Emergent and urgent cases were excluded. The cases were classified into two groups based on surgeon specialty: colorectal surgeon –board certified or board eligible- (CRS) and general surgeons or surgical oncologists (GS). Preoperative characteristics, intraoperative data, and postoperative outcomes were tabulated and compared.

Results/Outcome(s): A total of 1151 elective colectomies were identified. 288 (25.0%) elective colectomies were performed by GS. While patients were older in the GS group (63.3 vs 60.5 years old, $p<0.05$), there were no differences with regard to gender, ASA, and BMI. Overall, most cases were performed laparoscopically (63.8%). There was a higher proportion of laparoscopic cases in the CRS group (66.7% vs 55.2%, $p<0.05$). Postoperatively, there were more complications in the GS group (33.7% vs 21.7%, $p<0.05$), including rate of superficial surgical site infection (SSI) (4.5% vs 1.3%, $p<0.05$), deep SSI (3.5% vs 0.7% $p<0.05$), and pneumonia (2.8% vs 0.8%, $p<0.05$). There were no differences in deep venous thrombosis (DVT) or organ space SSI rate. Length of hospital stay (LOS) was three days shorter in the CRS group (7.9 vs 4.9, $p<0.05$). Thirty-day reoperation, readmission, and mortality rates were similar between groups. When comparing open cases only, colectomy performed by colorectal surgeons also resulted in shorter LOS (8.8 vs 6.1, $p<0.05$) and reduced complications (43.4% vs 29.3%,

$p < 0.05$). Similarly, when comparing laparoscopic colectomies, colorectal surgeon-performed operations resulted in shorter LOS (5.4 vs 4.2, $p < 0.05$) and fewer complications (25.7% vs 17.7%, $p < 0.05$).

Conclusions/Discussion: Our single-institution NSQIP analysis reveals that elective colectomies performed by colon and rectal surgeons are more likely to be laparoscopic and have a lower overall complication rate, including both superficial and deep surgical site infections. Moreover, elective colectomies performed by colon and rectal surgeons resulted in significantly shorter length of hospital stay.

FOLLOW-UP STANDARD FROM NCCN WILL IMPROVE ONE-YEAR SURVIVAL STATUS OF CHINESE COLORECTAL CANCER PATIENTS OR NOT?

P538

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Purpose/Background: The NCCN Guideline provide standardized follow-up rules for colorectal cancer patients in order to better effective interventions. The aim of this study is to find out whether follow-up of patients with colorectal cancer in China in accordance with the NCCN guidelines can achieve better survival outcomes, and potential influent factors of actually follow-up frequency.

Methods/Interventions: We retrospectively analyzed 391 patients (146 females, 37.34% and 245 males, 62.66%) who performer colorectal cancer surgeries in West China

Hospital between January 2016 and January 2017. A one-year follow-up survey was subsequently conducted and survival status as well as the frequency of follow-up were assessed. We defined the non-standard group (231, 59.38%) as not meeting with the requirements of frequency (once every 3 month) and quantity (at least 4 times per year) in the first year, while standard group (158, 40.62%) completely following. Survival status was divided into: no-tumor, suspicious with tumors, metastasis and recurrence, and death. Other factors included tumor location, pathologic staging, living city/urban (due to different journey afford) and medical insurance.

Results/Outcome(s): Standard group was proved to be significantly different in one-year survival outcomes when comparing with non-standard group ($G = -0.257$, $P = 0.001$). Non-standard group was tend to have poor prognosis ($c^2 = 16.13$, $P = 0.003$) including metastasis and recurrence ($P = 0.008$) and death ($P < 0.001$). Survival outcomes were also influenced by pathologic staging ($G = 0.590$, $P < 0.001$). Factors related to frequency of follow-up involved living city/urban ($P = 0.559$) and medical insurance ($P = 0.032$) according to logistic regression. Tumor location was found little correlation with both frequency and survival outcomes.

Conclusions/Discussion: Follow-up rules form NCCN guide can be benefit to better prognosis for Chinese colorectal cancer patients. However, the patients will be limited to reach the standard rules by their living cities/urbans and medical insurance. Next requirement is how to improve their follow-up quality, who stay far from center hospital and are in poor finance.

P537 Perioperative Outcomes

	General Surgeon (n=288)	Colorectal Surgeon (n=863)	P value
Age (years)	63.3±14.7	60.5±14.5	0.004
Female	147 (51.0%)	435 (50.4%)	0.892
ASA	2.5±0.6	2.5±0.6	0.430
BMI	27.1±6.0	27.3±6.2	0.511
Laparoscopy	159 (55.2%)	576 (66.7%)	<0.001
Postoperative Complications	97 (33.7%)	187 (21.7%)	<0.001
Superficial SSI	13 (4.5%)	11 (1.3%)	0.001
Deep SSI	10 (3.5%)	6 (0.7%)	<0.001
Organ Space SSI	14 (4.9%)	39(4.5%)	0.695
Pneumonia	8 (2.8%)	7 (0.8%)	0.011
DVT	3 (1.0%)	2 (0.2%)	0.070
Length of stay (days)	7.9±7.2	4.9±4.5	<0.001
Readmission rate*	2 (0.7%)	11 (1.3%)	0.420
Reoperation rate*	17 (5.9%)	36 (4.2%)	0.225
Mortality rate*	1 (0.3%)	2 (0.2%)	0.739

ASA=American Society of Anesthesiologists Score; BMI=Body mass index; DVT=Deep venous thrombosis; SSI=Surgical site infection.

*Thirty-day outcome

**A RANDOMIZED CONTROLLED TRIAL
COMPARING THUNDERBEAT(TB, OLYMPUS,
JAPAN) TO THE MARYLAND LIGASURE™
(MEDTRONIC, USA) ENERGY DEVICE DURING
LAPAROSCOPIC COLON SURGERY.**

P539

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Purpose/Background: The aim of this study was to compare the clinical performance in particular dissection time of the novel combined (ultrasonic and bipolar) energy device THUNDERBEAT (TB, Olympus, Japan) to Maryland LigaSure™ (Medtronic, USA) in performing soft tissue dissection, dividing and sealing blood vessels in patients undergoing laparoscopic left colectomy.

Methods/Interventions: 60 patients undergoing left colectomy were randomized in equal chances to Group1: THUNDERBEAT (Gr.1) or Group 2: Ligasure (Gr.2). The primary outcome was dissection time to specimen removal measured in minutes from the start of colon mobilization to specimen removal from the abdominal cavity. The left colectomy procedure was divided into six segments (Image1). Versatility (composite of five variables) was measured for each of the six segments and as overall score by a score system from 1-5 (1 being worst and 5 the best), and adjusted/weighted by Coefficient of Importance with distribution of the importance as follow: hemostasis 0.275, sealing 0.275, cutting 0.2, dissection 0.15, and tissue manipulation 0.1. Some of the other variables were: intraoperative and postoperative complications, dryness of surgical field and mortality. Follow-up time was 30 days

Results/Outcome(s): 44/60 patients, 22 female and 22 male were randomized thus far, 22 in Gr.1 and 22 in Gr.2. The median age in Gr.1 was 58.5(31-92) and in Gr.2 63(29-80) years, $p = .792$. The median (range) of

Body Mass Index was similar between the groups 25.8 ± 4.1 and $25.6(3.6)$, $p = .707$. In Gr.1, 11 patients underwent laparoscopic surgery for left colon neoplasm and 11 for sigmoid diverticulitis, while in Gr.2 seven patients had left colectomy for neoplasm and 15 for sigmoid diverticulitis. The THUNDERBEAT showed significantly higher overall versatility score (4.7 ± 0.4) than Ligasure (4.5 ± 0.3), $p = .007$, and higher versatility score in Segment 3 (4.9 ± 0.2) compared to Ligasure (4.6 ± 0.4), $p = .023$. THUNDERBEAT also had significantly higher score in sealing, dissecting and tissue manipulation in segment 3 (Omental Dissection) with $p = .032$, $p = .010$, and $p = .024$ respectively, and in sealing performance score in Segment 6 (mesenteric and pelvic dissection), $p = .014$ (Image1). There was no difference in the mean dissection time to specimen removal between the groups, Gr.1 (79.8 ± 31 min) and Gr.2 (63.5 ± 26 min), $p = .125$. There were no intra-operative or postoperative complications related to the energy devices used. There were no mortalities. No other differences were noted between the groups.

Conclusions/Discussion: Both instruments can be employed effectively and safely in laparoscopic colon surgery, with THUNDERBEAT demonstrating some advantages over Ligasure during omental dissection and sealing during mesenteric and pelvic dissection.

P538 Potential Factors Affected Frequency in Logistic Regression

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Uper
Survival Outcomes	-.285	.099	8.336	1	.004	.752	.620	.913
Living City	-.190	.467	.166	1	.683	.827	.331	2.065
Medical Insurance	-.330	.094	12.263	1	.000	.719	.598	.865
Tumor Location			.601	3	.896			
Tumor Location (colon)	.690	.902	.586	1	.444	1.994	.340	11.683
Tumor Location (rectum)	-19.906	.587	.000	1	.999	.000	0.000	
Tumor Location (colorectal)	-.609	.882	.477	1	.490	1.838	.327	10.346
Pathologic Staging	.056	.144	.149	1	.699	1.057	.798	1.401
Constant	.336	.979	.118	1	.731	1.399		

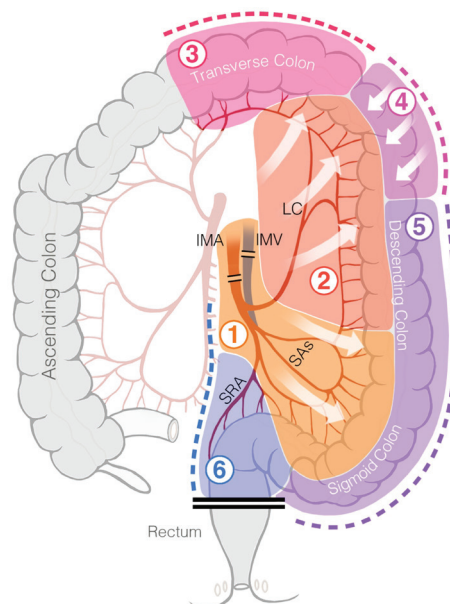


Image 1: Description of the segments in left colectomy procedure

- Segment 1: Dissection/division of IMA pedicle - division on or around IMA/IMV and within 2-3 cm of main vessels of mesentery (including window)
- Segment 2: Retroperitoneal dissection- dissection in retroperitoneum above and below IMA/IMV, above the sigmoid up to splenic flexure posteriorly
- Segment 3: Omental Dissection/resection- separation of omentum and mobilization of transverse colon up to the splenic flexure (not including splenic flexure)
- Segment 4: Splenic flexure takedown- take down of splenic flexure with complete separation of it from retroperitoneum
- Segment 5: Lateral colonic dissection- lateral freeing up of sigmoid and left colon to everything below splenic flexure
- Segment 6: Mesenteric and Pelvic dissection

THE DETERMINANTS OF MINIMALLY INVASIVE SURGERY FOR COLORECTAL CANCER IN EMERGENCY VERSUS ELECTIVE SETTINGS.

P540

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Purpose/Background: Minimally invasive surgery (MIS) improves colorectal cancer (CRC) outcomes, but it is used less frequently in emergency settings. The aim of this study was to identify patient-level factors associated with emergency presentation for CRC and the use of MIS in emergency versus elective settings.

Methods/Interventions: Using the Florida Inpatient Discharge Dataset, we examined the clinical data of patients who underwent emergency and elective resections for CRC during 2013-2015. Multivariable analyses were performed to identify differences in gender, age, race, urbanization, region, insurance and clinical characteristics associated with the mode of presentation and the surgical approach. In-hospital mortality and length of hospital stay by mode of presentation were recorded.

Results/Outcome(s): Of the 16,277 patients identified, 10,224 (61%) had elective surgery and 6,503 (39%) had emergency surgery. Emergency presentations were more

likely to be Black (14.2% versus 9.5%), Hispanic (18.9% versus 15.4%), Medicaid-insured (9.7% versus 4.2%), have metastatic cancer (34.4% versus 20.2%) or multiple comorbidities (12.6% versus 4.0%). MIS was the surgical approach in 31.8% of emergency cases versus 48.1% of elective cases. Factors associated with lower odds of MIS for emergency presentations include Medicaid (OR 0.79, CI 0.63-0.99), metastatic cancer (OR 0.56, CI 0.5-0.63), and multiple comorbidities (OR 0.53, CI 0.4-0.7). Emergency surgical cases experienced higher in-hospital mortality (3.7% versus 1.0%) and a longer median hospital stay (10 d versus 5 d) than elective cases.

Conclusions/Discussion: Emergency presentation for colorectal cancer was associated with racial minority, Medicaid insurance, metastatic disease and multiple comorbidities. Moreover, Medicaid insurance, metastasis and multiple comorbidities were associated with lower odds of MIS in emergency settings. There is a close relationship between the factors that influence emergency presentation for colorectal cancer and the use of minimally invasive surgery in this setting.

TIME TRENDS OF SURGICAL APPROACH TO COLORECTAL RESECTION PROCEDURES BETWEEN 2009 AND 2015.

P541

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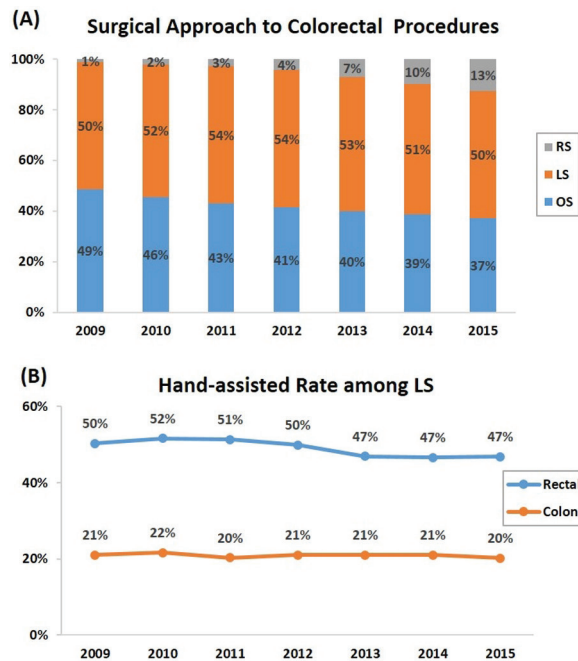
Purpose/Background: Surgery is the most common treatment for benign and malignant colorectal diseases. Significant improvements in patient outcomes have occurred with the adoption of minimally invasive laparoscopic and robotic approaches. An open surgical approach still remains the operative choice for a significant proportion of cases, this may be due both to patient factors and surgeons' preference. Hand-assisted laparoscopic surgery (HALS), a hybrid approach, was proposed and used as a bridge or facilitative adjunct to standard laparoscopic surgery. Limited data are available for the adoption trends of three main surgical approach modalities open (OS), laparoscopic (LS) or robotically-assisted (RS)) and the hand-assisted rates among LS at the national level in varied hospital settings. Using a retrospective population-based database, we describe the temporal trends of the surgical approach for colorectal diseases.

Methods/Interventions: The Premier Hospital Perspective Database (PHPD), contains approximately 25% of annual United States inpatient admissions from a cohort of geographically diverse hospitals including community, teaching, and non-profit facilities. PHPD was queried for time period January 2009 through September 2015 to identify patients who underwent inpatient, elective colon and rectal resections; emergency procedures were excluded. Data collection ending September 2015

was used because of the ICD10 transition and after this time the rectal surgery procedure codes have not fully mapped to allow for analysis from 2016-18. ICD-9 codes were used to identify colorectal surgeries, the subset of resection codes were examined and eligible procedures were analyzed by anatomic site of resection: left hemicolectomy or sigmoidectomy (Left), right hemicolectomy (Right), and low anterior or abdominal perineal resection (Rectal); and by operative approach: OS, LS or RS. MIS cases that converted to OS (ICD-9 code V64.41) surgeries were counted as the original planned approach, LS or RS. Among LS, we further identified the use of HALS approach from query of the billing text string for “hand assist”, “HALS” or “gel port”. Temporal adoption trends of different surgical approaches were described.

Results/Outcome(s): A total of 202,158 inpatient, elective colorectal resection procedures were identified. Anatomic site of resections were: Right (39.6%), Left (43.0%) and Rectal (17.5%). In the entire cohort (Figure A), the use of RS increased from 1.3% (2009) to 12.7% (2015), OS decreased from 48.5% (2009) to 37.1% (2015), and LS remained relatively constant over the time period (fluctuating between 50.2% and 54.2%). The largest change in resection approach between 2009 and 2015 was observed in Rectal: RS increased 12.5 fold from 1.6% to 20.5%, while OS dropped from 80% to 58.7%. Similar trends were found in Left, RS increased from 1.3% to 12.7%; and for Right, RS increased from 1.1% to 8.5%. The rate of HALS in LS also remained stable over the time period across all three resection procedures 22.7% (2009) to 22.6% (2015). HALS approach accounted for 48.7% of the laparoscopic rectal resections and 20.9% of the laparoscopic colectomies (Figure B).

Conclusions/Discussion: Between 2009 and 2015, the proportion of all colorectal resection procedures performed by RS has increased with a concomitant decrease in the use of OS. The total proportion of HALS for all procedures, as well as by anatomic site, have remained constant over time, with the highest proportion observed in rectal procedures. Minimally invasive surgery continues to displace open surgery as the choice for operative approach. HALS remains a significant proportion of LS cases, and it is unclear based on published evidence if these patients experience the same benefits of a fully LS or RS approach and this should be further investigations.



ARE OUTCOMES BETWEEN PATIENTS UNDERGOING COLOVAGINAL AND COLOVESICULAR FISTULA REPAIRS SIMILAR?

P542

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Purpose/Background: There is currently a paucity of data evaluating preoperative characteristics and outcomes in patients undergoing repair of a colovesicular or colovaginal fistula. These two disease processes, while similar, can present unique surgical and management challenges. The goal of this study was to compare the preoperative characteristics and perioperative outcomes associated with the repair of colovesicular and colovaginal fistulas via an abdominal approach using the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database.

Methods/Interventions: We identified patients who underwent repair of a colovaginal or colovesicular fistula by ICD 9 and 10 codes between 2006-2016 using the NSQIP database. All patients that underwent a transvaginal, transanal, or perineal approach were excluded. We stratified these patients by diagnosis of colovaginal and colovesicular fistula. Preoperative, perioperative, and postoperative outcomes were compared using chi-square analysis.

Results/Outcome(s): 1682 patients were identified who underwent an abdominal repair of a colovaginal or colovesicular fistula. Patients were similar in smoking status and steroid use. Colovesicular patients overall had more comorbidities compared with colovaginal patients. They were older (64 versus 60 yrs, $p < 0.01$), more obese (180.9

kg versus 166.9 kg, $p < 0.01$), more likely to have hypertension (58.0% versus 47.2%, $p < 0.05$), and more likely to have an ASA class of 3 or 4 (57.9% versus 48.5%, $p < 0.05$). Colovaginal patients were more likely to undergo an open operation (59.0% versus 31.9%, $p < 0.05$). Interestingly, colovesicular patients were more likely to have contaminated or dirty wound classification than colovaginal patients (24.8% versus 22.4% and 23.6% versus 15.9%, $p < 0.01$). The overall ostomy creation rate was 25.7%. Although not significant, patients undergoing a colovesicular fistula repair were more likely to have an ostomy created (28.6% versus 22.4%, $p = 0.15$). Postoperative outcomes were similar except colovesicular patients had a significantly longer mean length of stay (LOS) (8.5 days versus 6.5 days, $p < 0.05$) compared to colovaginal patients.

Conclusions/Discussion: To our knowledge this is the largest study analyzing preoperative characteristics and post-operative outcomes comparing colovaginal and colovesicular fistula repairs. Patients undergoing a colovaginal fistula repair were much more likely to have an open approach, likely indicating increased technical difficulty. Surprisingly, ostomy creation was not statistically significant between the two groups and trended towards colovesicular fistula repairs. This could be attributed to the colovesicular fistula patients having more comorbidities and might explain their increased LOS.

SAME-DAY AND NEXT-DAY DISCHARGE AFTER LAPAROSCOPIC COLECTOMY: PUSHING THE ENVELOPE OF ENHANCED RECOVERY PATHWAYS.

P543

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Purpose/Background: Enhanced recovery pathways after colorectal surgery have reduced post-operative lengths of stay to as short as three days after laparoscopic colectomy, with no concurrent increase in post-operative morbidity. Select centers in Europe have recently taken this a step further and demonstrated the safety of same-day discharge after colectomy in small series of patients. Therefore, the aims of this project were to determine 1) the feasibility and safety of same-day and next-day discharge in a large cohort of patients in the United States and 2) what patients would potentially be eligible for an expedited discharge pathway.

Methods/Interventions: The 2012-2016 American College of Surgeons National Surgical Quality Improvement Program Colectomy Participant User Files were queried for patients undergoing laparoscopic segmental colectomy with a primary anastomosis for a diagnosis of malignancy, benign neoplasm, diverticular disease, or inflammatory bowel disease. Patients were grouped into early (discharge

on post-operative day [POD] 0/1), intermediate (POD 2), and standard (POD 3-5) discharge groups. Patients who experienced any complications during the index hospitalization were excluded. Early readmission was defined as readmission on or before POD 7 in the patients in the early discharge group. Multivariable logistic regression and Cox regression were performed to adjust for confounding and to assess the independent impact of discharge day on anastomotic leak, ileus, and readmission.

Results/Outcome(s): A total of 906 patients were discharged on POD 0/1, with 75% 68 years of age or less (median, 60 years) and 52% female. The most common operative indication was for benign neoplasm (54%) followed by malignancy (26%). Very few patients were anemic (2%), malnourished (6%), or on immunosuppression preoperatively (3%). Only 2% of patients discharged on POD 0/1 were readmitted within 7 days of surgery, with ileus being the leading reason for early readmission. Combining the early discharge group ($n = 906$) with the intermediate ($n = 6,825$) and standard discharge groups ($n = 28,795$) yielded 36,526 operations without complications during the index hospitalization. Post-discharge, the rates of 30-day anastomotic leak (early: 0.6%, intermediate: 1.0%, standard: 1.2%), ileus (early: 1.9%, intermediate: 1.5%, standard: 2.1%), and readmission (per 30-person days; early: 5.3%, intermediate: 6.0%, standard: 7.0%) were similar between the three discharge groups. On multivariable analysis, early discharge did not have any effect on anastomotic leak (versus standard discharge; adjusted odds ratio [AOR]: 0.5, 95% confidence interval [CI]: 0.2-1.1), ileus (AOR: 0.9, 95% CI: 0.5-1.4), or readmission (adjusted hazards ratio: 0.8, 95% CI 0.5-1.0) (TABLE).

Conclusions/Discussion: In carefully selected patients, same-day and next-day discharge after colectomy is safe, with a low rate of both early and overall readmission and complications. The preadmission counseling that is already a part of enhanced recovery could incorporate the possibility of same-day or next-day discharge in appropriate patients. Increased utilization of this discharge practice will reduce resource utilization and hospitalization costs.

TABLE. Select Results from Multivariable Models for Anastomotic Leak, Ileus, and Readmission

Variable	Anastomotic Leak, Odds Ratio (95% CI)	Ileus, Odds Ratio (95% CI)	Readmission, Odds Ratio (95% CI)
<i>Discharge Group - Reference: POD 3-5</i>			
POD 0/1	0.5 (0.2-1.1)	0.9 (0.5-1.4)	0.8 (0.5-1.0)
POD 2	0.8 (0.6-1.1)	0.7 (0.6-0.9)	0.8 (0.8-1.0)
<i>Diagnosis - Reference:</i>			
<i>Benign Neoplasm</i>			
Cancer	1.1 (0.8-1.4)	1.0 (0.8-1.2)	1.1 (1.0-1.2)
Diverticular disease	1.2 (0.9-1.6)	0.8 (0.6-1.0)	1.0 (0.9-1.2)
IBD	0.4 (0.2-0.9)	1.0 (0.7-1.4)	1.0 (0.8-1.3)
Steroid Use	2.3 (1.5-3.5)	-----	1.5 (1.2-1.8)
Tobacco Use	1.9 (1.5-2.4)	1.6 (1.3-1.9)	1.2 (1.1-1.4)
Male	1.4 (1.2-1.8)	1.3 (1.1-1.5)	-----
<i>BMI - Reference: Normal</i>			
Underweight	-----	1.4 (0.8-2.5)	-----
Overweight	-----	1.0 (0.8-1.2)	-----
Obese	-----	1.2 (0.9-1.4)	-----
<i>Bowel Prep - Reference: No prep</i>			
Mechanical and antibiotic	0.7 (0.5-0.9)	-----	-----
Mechanical only	0.8 (0.6-1.1)	-----	-----
Antibiotic only	0.9 (0.6-1.6)	-----	-----
Missing	0.8 (0.6-1.1)	-----	-----

POD - Post-operative day; IBD - Inflammatory bowel disease; BMI - Body mass index

TUMOR SIDEDNESS, RECURRENCE AND SURVIVAL: ANOTHER IMPORTANT DIFFERENCE BETWEEN LOCALIZED COLON CANCER.

P544

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Purpose/Background: Right-sided primary tumor location is associated with worse prognosis in metastatic colon cancer, but the effect of sidedness on recurrence, treatment stratification, and prognosis for non-metastatic disease is less understood. This study aims to examine the relationship between sidedness and the outcome of recurrence and survival, including survival after recurrence among patients with localized colon cancer.

Methods/Interventions: Consecutive patients who underwent curative resection of colon cancer during January 2006 through December 2013 were analyzed using a retrospective institutional database supplemented by chart review. Survival (cancer specific [CSS], overall [OS], and survival after recurrence [SAR] was compared between left- and right-sided tumors using multivariable Cox proportional hazards regression.

Results/Outcome(s): We evaluated 673 patients with colon cancer (347 right-sided). There was no difference in adjusted overall recurrence rates (hazard ratio [HR] = 0.92, 95% confidence interval [CI] 0.54 - 1.55; P = 0.75) or OS (HR = 1.22, 95% CI 0.75-1.97; P = 0.42) between right- and left-sided primary tumors. However, right-sided tumors were more likely to develop multi-focal recurrence (P = 0.04). CSS was worse overall (HR 3.09, 95% CI 1.18 - 8.1; P = 0.02) and among the 71 patients who developed recurrence, those with right-sided tumors had significantly lower SAR (HR = 3.88, 95% CI 1.42 - 10.62; P = 0.008). Salvage surgery was performed in 33% with right- vs 46.3% in left-sided primary tumors (P = 0.27).

Conclusions/Discussion: Among colon cancer patients who underwent curative resection, tumor sidedness was not associated with rates of recurrence or overall survival. However, among patients who developed recurrence after curative resection, right-sidedness was associated with unique recurrence patterns and inferior SAR. For patients

presenting with localized disease, treatment stratification should not be based on tumor sidedness alone.

THE IMPACT OF IMMUNONUTRITION ON LENGTH OF STAY WITHIN AN ERAS PROTOCOL.

P545

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Purpose/Background: Enhanced Recovery Protocols have been widely accepted as a means to improve outcomes following various surgical procedures. Many ERAS protocols include Immunonutrition and carbohydrate loading. The impact of such nutritional supplementation is not well defined. There is some evidence that it may impact infectious complications as well as length of stay. The aim of this study was to review the impact of Immunonutrition on length of stay in an ERAS protocol.

Methods/Interventions: The data warehouse of a University tertiary referral center was queried for data on patients undergoing colorectal surgery a year after the implementation of an ERAS protocol. The data abstracted included type of procedure, surgical approach (open versus laparoscopic), length of stay, readmissions within 30 days, complications (SSI and anastomotic leak), Impact Advance Recovery (IAR) use, Clearfast (CF) use and Glycemic Endothelial Drink (GED) use. The data were analyzed using StataCorp. 2015. *Stata Statistical Software: Release 14.* (College Station, TX: StataCorp LP). Quantitative variables were analyzed using the student's t-test and categorical variables were analyzed using chi-square and Mann Whitney U test. Statistical significance was set at a p-value < 0.05.

Results/Outcome(s): A total of 167 patients underwent colorectal procedures under the ERAS protocol in a 12-month period. The mean length of stay was 5.68 days and the median length of stay was 4 days. Patients who received IAR had a statistically significant shorter length of stay compared to those who did not receive it (4.96 days versus 6.06 days, p = 0.014). Similarly, patients who received GED had a statistically significant shorter length

P545 Table 1: Length of Stay

Factor (n)	Length of Stay (days)	P-value
IAR+ (90)	4.96	0.014
IAR- (77)	6.06	
GED+ (45)	4.55	0.018
GED- (122)	5.81	
IAR+CF/GED (44)	5.27	0.012
None (73)	6.16	
IAR or CF/GED (92)	4.96	0.0005
None (73)	6.16	

Abbreviations: IAR – Impact Advance Recovery®, GED – Glycemic Endothelial Drink®, CF - Clearfast®

of stay compared to those who did not receive it (4.55 days versus 5.81 days, $p = 0.018$). Patients who received both IAR and GED/CF also had a statistically significant shorter length of stay compared to those who did not (5.27 days versus 6.16 days, $p = 0.012$). Patients who received either IAR or GED/CF also had a significantly shorter length of stay compared to those who did not receive any nutritional supplementation ($p = 0.0005$). There were no differences in infectious complications and readmissions based on nutritional supplementation.

Conclusions/Discussion: Immunonutrition and carbohydrate loading within an ERAS protocol are associated with a statistically significant decrease in length of stay. On average nutritional supplementation was associated with at least a one-day decrease in length of stay. However, it did not have any impact on infectious complications or 30-day readmission rates.

PROLONGED FOLEY CATHETERIZATION WITH PRE-REMOVAL CYSTOGRAM AFTER SURGICAL REPAIR OF COLOVESICAL FISTULA: ARE WE BEING TOO VIGILANT?

P546

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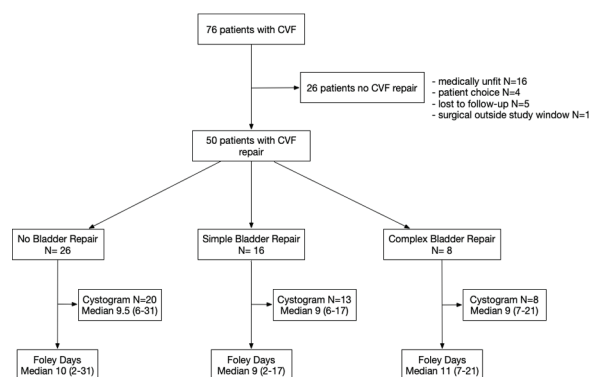
Purpose/Background: Colovesical fistula (CVF) is an infrequent but morbid disease. Surgical repair is usually recommended for patients able to tolerate an operation, but bladder management following surgical repair has not been standardized. The aim of this study is to characterize post-operative management of the Foley catheter and use of cystogram following colovesical fistula repair at a single institution.

Methods/Interventions: This is a retrospective review of consecutive patients admitted to an academic medical center with diagnosis of CVF between 1/1/15 and 12/31/17. Patient characteristics, surgical factors, outcomes, and perioperative management were recorded. Summary statistics were used to characterize use of cystogram and timing of Foley catheter removal.

Results/Outcome(s): During the study period 50 patients underwent surgical repair of CVF by board certified colorectal surgeons, 28 (56%) were male, 47 (94%) were white, and median age was 66.5 years, range 41-89. Previous hysterectomy was reported for 9 (41%) of females. Patients had urinary symptoms (pneumaturia, hematuria, dysuria, UTI, frequency) for a median of 85 days before surgery, range 0 - 450. Pre-operative colonoscopy within 1 year of surgery was documented in 29 (58%) of patients and ureteral stents were placed in 31 (62%) of patients. Diverticular disease was the most common etiology ($n=47$, 94%). Minimally invasive

approach (laparoscopic or robotic) was performed in 37 (74%) with 3 cases (8%) converting to open approach. Fecal diversion was performed in 16 (32%; 8 end colostomy, 8 diverting loop ileostomy). Complex bladder repair was performed in 8 (16%) cases, simple suture repair in 16 (32%) cases, and the remainder had no bladder repair. Median postoperative length of stay was 5 days, range 2 - 37. Median urinary catheter duration was 10 days, range 2-31, with 3 (6%) removed before post-operative day 7, 28 (56%) removed on day 7-10, and 19 (38%) removed on day 11 or later. There were 41 (82%) patients who underwent cystogram prior to Foley removal at a median of 9 days, range 6-31. None of the cystograms were positive for urine leak, and the 9 patients without cystogram did not have clinical evidence of urine leak. The most common surgical complications were catheter-associated urinary tract infection requiring antibiotic treatment at 8 (16%) and superficial SSI at 5 (10%). The 30-day post-discharge readmission rate was 10% (5 patients).

Conclusions/Discussion: In this single institution review of patients with CVF repair, the majority of patients had prolonged use of a Foley catheter and negative post-operative cystograms. Routine use of cystogram prior to Foley catheter removal may be unnecessary. Given the low yield of routine cystograms, the negligible incidence of post-operative urine leaks, and high post-op CAUTI rates, a standardized approach for early Foley catheter removal with or without a cystogram should be considered. Prospective studies are needed to determine if routine catheter removal before post-op day 7 is safe and feasible.



EFFECT OF WEB-BASED PERIOPERATIVE PROGRAM ON SELF-EFFICACY, OUTPATIENT CALLS AND EMERGENCY DEPARTMENT VISITS OF PATIENTS UNDERGOING ELECTIVE COLORECTAL SURGERY.

P547

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Purpose/Background: Surgical patients, overwhelmed by their underlying diseases and impending operations, are often unable to absorb the large volume of information regarding preoperative tasks and postoperative expectations. Inadequate preparation and lack of engagement in the recovery process may lead to delays in care, poor adherence to Enhanced Recovery After Surgery pathways, and worse outcomes. We aimed to determine how implementation of web-based patient engagement program affected the patient experience, specifically related to outpatient telephone calls and patient self-efficacy during the perioperative period, and visits to the emergency department after surgery.

Methods/Interventions: Adult patients undergoing elective abdominal colorectal operations between October 2017 and September 2018 [were invited to enroll in a web-based perioperative program, accessible by smartphone, tablet, and desktop. The program provided 1) reminders of pre-operative instructions and post-operative expectations, 2) surveys of patient-reported outcomes and patient self-efficacy, and 3) information about colorectal operations. Patients were enrolled at least one week before their operations and were surveyed about their self-efficacy at the start of the program. Thirty days after surgery, patients were surveyed again about their self-efficacy and about the web-based program's impact on the frequency of their clinical encounters. Self-efficacy measures were assessed using a 5-point Likert scale (1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree) and averaged. A paired t-test evaluated differences in the baseline and 30 days post-op surveys.

Results/Outcome(s): Of 185 patients, 45 (24%) completed the self-efficacy surveys at both baseline and 30 days after their surgery. There was a statistically significant increase in knowledge of preparation for surgery ("I know/knew what to do to prepare for surgery.") following the perioperative program ($p=0.018$). When asked about feeling anxious for surgery at the start of the program and anxiety related to the recovery process at the end of the program, there was a statistically significant decrease in anxiety after surgery ($p<0.001$). Additionally, of the 63 patients who completed the program evaluation survey, 43 (68%) reported that the web-based perioperative program prevented one or more outpatient phone calls to the clinic or hospital after discharge, and 19 (30%) patients reported that the program prevented one or more return visits to the emergency department.

Conclusions/Discussion: Personalized patient engagement technologies may help some patients feel more prepared for surgery and reduce anxiety surrounding the perioperative process. Web-based patient programs may also prevent unnecessary hospital visits or phone calls, potentially reducing the work burden of outpatient clinical staff and healthcare resource use. Further work is required to determine effective engagement strategies that improve self-efficacy for the majority of surgical patients.

ONE SIZE DOES NOT FIT ALL: SURGICAL DECISION-MAKING FOR RECTAL PROLAPSE.

P548

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Purpose/Background: Over the past decade, ventral mesh rectopexy has become the preferred repair for rectal prolapse. However, the criteria for patient selection for abdominal versus perineal procedures for rectal prolapse remain ambiguous, leading to high variability in practice patterns. This study aims to assess the patient- and disease-related factors that affect surgical decision making for patients with rectal prolapse.

Methods/Interventions: A retrospective review of consecutive rectal prolapse patients July 2017 to November 2018 was performed. Clinical variables collected included comorbidities, risk factors for recurrence, and prolapse characteristics. Patient quality of life measures including primary prolapse symptoms, Wexner Cleveland Clinic Fecal Incontinence (CCFI) scores and obstructed defecation scores (ODS) were recorded. Surgeon treatment recommendation and actual treatment rendered were recorded. Patients who declined surgical intervention were contacted to determine the reasons for their decisions. The main outcome measure was surgeon treatment recommendation (no operation, abdominal operation, or perineal operation). Univariate analyses using chi-square was performed using variables of age group, race, sex, primary language body mass index, ASA status, cardiopulmonary disease, frailty, hostile abdomen, prolapse type, risk factors for recurrence, hostile abdomen, desire to avoid long anesthetic time, desire to avoid mesh, CCFI score, ODS, and primary symptoms. Multivariable logistic regression using significant factors from the univariate analyses was performed. **Settings:** This study was conducted at a single academic tertiary referral center. **Patients:** We included all patients ≥ 18 diagnosed with full-thickness rectal prolapse, high-grade internal prolapse, and significant mucosal prolapse. We excluded patients with limited mucosal prolapse. **Main Outcome Measures:** Surgical treatment decision of rectal prolapse: no operation vs. abdominal operation vs. perineal operation.

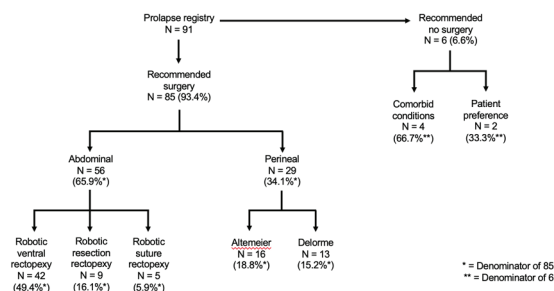
Results/Outcome(s): Among 91 patients, 93% were women and the mean age was 64.5 years (range 18-94).

Full thickness rectal prolapse was diagnosed in 94%, high-grade internal rectal prolapse in 6%, and mucosal prolapse in 2%. Surgical intervention was recommended to 93%. On univariate analysis, recommendation for a perineal procedure was associated with older age (79.5 vs 58 years old, $p < 0.001$), higher ASA status, cardiopulmonary comorbidity, frailty, and surgeon concern over prolonged anesthesia time. Mean CCFI score did not differ significantly among patients recommended to have no operation vs. abdominal operation vs. perineal operation (7.8 vs. 12.1 vs. 13.6, $p = \text{NS}$). Mean ODS scores were significantly higher in patients recommended to have abdominal operations compared to perineal and no operations (9.0 vs. 6.8 and 5.3, $p = 0.01$). Multivariable logistic regression demonstrated that older age group and surgeon concern over a hostile abdominal surgical field were independently associated with recommendation for perineal procedures. Among 42 patients (46%) who reported urinary incontinence, 59.5% were referred for urological consultation to discuss a combined procedure, compared to 31.3% of patients without urinary incontinence ($p = 0.018$). Among patients recommended to undergo abdominal and perineal operations, 75% and 69% agreed to proceed with surgical intervention. These patients were more likely to have primary symptoms of mucus drainage ($p = 0.005$) compared to patients who did not undergo an operation, and less likely to have cardiopulmonary comorbidity and surgeon concern over the risks of general anesthesia ($p < 0.05$).

Limitations: Retrospective design and single surgeon experience.

Conclusions/Discussion: Ventral rectopexy is our most commonly recommended abdominal procedure. Perineal procedures continue to be the preferred technique for patients at highest operative risk due to age and comorbidities. Concerns over the risk of general or prolonged anesthesia due to patient comorbidity is a predominant reason for pursuing non-operative management. Surgeons who treat patients with rectal prolapse should be proficient in all surgical techniques in order to offer the widest range of options.

Surgical Recommendations for Rectal Prolapse



Breakdown of 91 consecutive registry patients by recommended surgical procedure

PERITONEAL LAVAGE CULTURE ANALYSIS OF 3D LAPAROSCOPIC AND LAPAROSCOPY-ASSISTED ANTERIOR RESECTION OF RECTAL CANCER.

P549

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Purpose/Background: Analysis of peritoneal lavage fluid by 3D laparoscope without abdominal incision and small incision before resection of rectum through arthroscopic protective sheath.

Methods/Interventions: Patients with upper rectal and sigmoid cancer who received curative 3D laparoscopic or laparoscopy assisted surgery at the department of Colorectal Surgery of Shanghai East hospital between November 2016 and June 2017 were selected. Postoperative peritoneal washings of the patients were subjected to bacterial and fungi culture. Differences of clinical-pathological variables between laparoscopic and laparoscopy assisted surgery group were analyzed as well.

Results/Outcome(s): 26 and 34 patients were eligible for laparoscopic (LS) and laparoscopy assisted surgery (LAS) group, respectively. Peritoneal washings of 2 patients in the LS group were demonstrated to be positive with enterococcus faecium, enterococcus faecalis and enterobacter cloacae; while results were positive for 1 patient in the LAS group with enterococcus faecalis and enterobacter cloacae contamination. Fungi contaminations were observed in neither of the two groups. Furthermore, distance of tumor from the anal verge, maximum length of the tumor and the pT stages were significantly larger in the LAS group, compared with the LS group. However, no differences were found between them in patient sex, age, histology, differentiation level, vascular invasion, perineural invasion or pN stages.

Conclusions/Discussion: Using the arthroscopic protecting jacket to facilitate TRES, LS for upper rectal and sigmoid cancer does not lead to significant increase of peritoneal contamination, and has a similar therapeutic effectiveness as LAS.

INITIATION OF ENHANCED RECOVERY AFTER SURGERY PROTOCOL WITH MULTIMODAL ANALGESIA DECREASES OPIATE USE IN COLON AND RECTAL SURGERY.

P550

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Purpose/Background: Enhanced recovery after surgery (ERAS) protocols have been shown reduce measurable recovery outcomes such as hospital stay, postoperative pain, hospital readmission, and complications. Our institution initiated a multimodality analgesia protocol based on

these potential benefits. The objective of this study was to evaluate postoperative outcomes before and after initiation of our ERAS protocol in colon and rectal surgery patients.

Methods/Interventions: Retrospective chart review was performed on all inpatient colorectal surgeries performed at a single institution during two distinct seven month time frames. January to July 2017 constituted surgeries performed prior to ERAS protocols and December 2017 to June 2018 was after initiation of ERAS protocols. Our protocol consisted primarily of multimodality analgesia during all phases of surgery. Preoperatively, patients were given oral gabapentin, acetaminophen, celecoxib, and tramadol. At the time of surgery, anesthesiology performed four-quadrant transverse abdominis plane blocks and infused ketamine. During postoperative hospital recovery, oral gabapentin, tramadol, and celecoxib were given primarily for pain control with opiates available only as a backup option for severe pain. Primary outcome measures were postoperative inpatient opiate consumption and pain scores. Length of hospital stay was a secondary outcome measure. Data were grouped and analyzed using student's t-test, $p < 0.05$ considered statistically significant.

Results/Outcome(s): A total of 265 and 279 colorectal procedures were performed before and during ERAS periods, respectively (Table). Postoperative opiate use decreased 55% from 40.8 ± 12.6 morphine-milligram-equivalent (MME) to 18.5 ± 8.6 MME ($p = 0.00005$). Mean length of stay decreased from 120.8 ± 14.3 hours to 108.2 ± 9.6 hours after starting ERAS protocol, but this did not reach statistical significance ($p = 0.26$). There were no differences in pain scores at immediate postop or day of hospital discharge.

Conclusions/Discussion: Our enhanced recovery protocol with multimodal analgesia significantly reduced postoperative opiate consumption following colon and rectal surgery without affecting postoperative pain scores. This suggests that multimodal analgesia strategies with non-narcotic medications have equivalent pain control properties compared to opiates. Although length of stay was trending down after ERAS initiation, this did not reach statistical significance. Narcotic related complications were not monitored in the current study, but the marked reduction in postoperative opiate consumption justifies continued utilization of this ERAS protocol and perhaps widespread adoption across other surgical specialties.

SHOULD ACCURACY OF RECTAL CANCER STAGING SERVE AS A STANDARD FOR THE NATIONAL ACCREDITATION PROGRAM FOR RECTAL CANCER?

P551

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Purpose/Background: The National Accreditation Program for Rectal Cancer includes many standards for program qualification, but clinical staging accuracy is not one of them. In this analysis, we determine the frequency of under-staging of rectal cancer as well as the proportion of under-staged patients who do not receive recommended neoadjuvant therapy.

Methods/Interventions: We abstracted all cases of clinically staged (cT1-2) adenocarcinoma of the rectum from 1/2004 through 12/2015 in the American College of Surgeons Commission on Cancer (ACS-CoC) National Cancer Database. Next, we recorded clinical and pathologic stage and determined discordance between clinical and pathologic stage for these early stage tumors. Then, we determined the proportion of patients who were under-staged and did not receive neoadjuvant therapy as recommended by NCCN guidelines. We used SAS 9.4 to analyze rate of under-staging in relation to patient demographics, tumor characteristics, and treatment facility.

Results/Outcome(s): We identified 34,447 patients with clinical stage (cT1-2) N0, M0 rectal cancer. After radical excision, 20% of patients who were clinically classified as cT1-2 were pathologically staged as T3-4 and another 20% of patients clinically classified as N0 demonstrated lymph node metastases. In total, 31% of patients who had clinically staged I disease by preoperative staging had more advanced stage (stage 2-3) on their final pathology. Ultimately, 78.7% of patients with clinically under-staged rectal cancer (true pathologic stage 2/3) did not have standard neoadjuvant therapy because of their preoperative clinical staging. We noted that under-staging occurred in a variable fashion across ACS-CoC accredited facilities ($p < 0.0001$) with an institutional accuracy for these early tumors ranging from 3% to 100% when greater than 10 patients were treated. In aggregate, facilities classified as Academic/Research Programs were most accurate

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	Before ERAS n=265	With ERAS n=279	p Value
Total Opiate Use (MME)	40.8 ± 12.5	18.5 ± 8.5	0.00005
Pain Score on POD#0	2.4 ± 0.2	2.1 ± 0.2	0.25
Pain Score on Discharge Date	2.3 ± 0.1	2.1 ± 0.1	0.32
Length of Stay (hours)	120.8 ± 14.3	108.2 ± 9.5	0.26

MME, morphine milligram equivalent

in clinical staging of early-stage rectal cancer (49% as compared to 41.7% in Community Cancer Programs; $p < 0.001$).

Conclusions/Discussion: Approximately one quarter of rectal cancers clinically staged as early disease (cT1-T2) are found to have more advanced tumors after pathologic staging, leaving 78.7% of patients without NCCN recommended neoadjuvant therapy. Academic/Research Programs were most accurate in clinical staging but there was considerable variability in preoperative staging of these early rectal tumors. Quality improvement programs are needed to implement and standardize effective clinical staging programs while monitoring results across ACS-CoC centers. Given the critical importance of appropriate clinical staging and the tremendous gap between high performers and low performers, the National Accreditation Program for Rectal Cancer should consider clinical staging as an additional clinical services standard for program qualification and maintenance of accreditation.

PATIENT COMPLIANCE ON EXTENDED VENOUS THROMBOEMBOLISM PROPHYLAXIS AFTER MAJOR COLORECTAL SURGERY: A QUALITY ANALYSIS.

P552

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Purpose/Background: Venous thromboembolism (VTE) is a significant cause of preventable morbidity and mortality after major colorectal surgery. Most healthcare systems adhere to the VTE prophylaxis guidelines during the hospitalization, however, current evidence states that some patients continue to be at a significantly higher risk for VTE after discharge and would benefit from continued VTE prophylaxis for 4 weeks. It is for these patients extended VTE prophylaxis (eVTEP) is recommended based on individualized risk assessment. Once patients are discharged from the hospital logistics of providing eVTEP and compliance can be a cause of concern. There are very few studies on actual eVTEP compliance. **Objective:** Purpose of this study is to determine the degree of compliance to the eVTEP after major colorectal surgery and investigate barriers to the adherence.

Methods/Interventions: The eVTEP in patients undergoing colorectal surgery at our institution has been individualized based on Caprini Risk Assessment Module (CRAM). We conducted retrospective audit of all patients who underwent colorectal surgery for cancer performed by five colorectal surgeons at a large urban County Hospital. Contiguous 21-month data were collected retrospectively concerning details of on diagnoses, patient risk factors predisposing to VTE, methods utilized to enforce compliance, actual patient compliance after discharge and

ninety-day incidence of VTE. All patients who qualified for eVTEP based on CRAM were enrolled. They were prescribed a prophylactic dose of enoxaparin or heparin for four weeks postoperatively including the period of hospitalization. Patients on therapeutic anticoagulation and non-responders to follow-up were excluded. We performed univariate analysis to identify factors associated with protocol compliance.

Results/Outcome(s): Overall, 106 patients (62 females and 44 males) met the criteria and were prescribed chemical eVTEP based on individualized CRAM score. The average duration of outpatient prescription was 25.3 days. Sixty patients (56.6%) responded to the inquiry (24 females and 36 males). Overall protocol compliance was 70% (42 patients, 16 females and 26 males). Eighteen patients (30%) did not take injections as prescribed due to various reasons, most common being lack of awareness of prescribed medication (7 patients; 11.6%). Other reasons included: ambulatory status and did not feel a need of eVTEP (6.6%), fear of side-effects (3.3%), actual side effects (1.6%), simply 'forgot' to take (3.3%) and lack of education. Forty-six patients (43.4%) did not respond, therefore compliance could not be assessed. Most commonly performed surgeries were laparoscopic partial colectomy (36.6%) and laparoscopic low anterior resection (21.6%). Overall, 30% were open and 60% were laparoscopic procedures. We plan to include ninety-day incidence of VTE in study patients.

Conclusions/Discussion: Despite known advantages of individualized eVTEP and reinforcement of guidelines, the actual patient compliance remains low. Various factors play a role. The lack of perceived benefits of eVTEP by patients, lack of education and inconsistent reinforcement by various healthcare team members are major identifiable barriers. The study is limited due to a small number of patients.

USING EMR TO IMPLEMENT AND TRACK COMPLIANCE OF A UNIQUE COLON BUNDLE THAT REDUCED SURGICAL SITE INFECTION IN COLORECTAL SURGERY: A SINGLE INSTITUTION REVIEW.

P553

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Purpose/Background: Surgical site infections (SSI) remain a common complication of colorectal surgery and are associated with a significant increase in direct costs and hospital lengths of stay. Additionally, patients who develop SSI following colorectal surgery are at increased risk of postoperative morbidity and mortality. The implementation of colorectal surgical care bundles is a highly effective strategy to reduce SSI in this patient population. When stratified, the establishment of these bundles has

significantly reduced the risk of superficial SSI as well as deep wound infections. While it is well studied that surgical care bundles reduce infection, there is no established consensus on the optimal amalgamation of pre-, intra- and post-operative interventions. Many of these preventative protocols have select combinations of similar elements, including strategies for skin preparation and hair removal, use of mechanical bowel prep, antibiotic prophylaxis, sterile technique guidelines for closure and gloving, maintenance of normothermia and targets for glycemic control. Increasing the number of preventative care measures within the bundle has been associated with a stepwise reduction in SSI. Checklists and use of standardized order sets have been successfully implemented to increase the compliance rates of these bundles. This review presents the efficacy and implementation of a detailed surgical care bundle to reduce the rate of SSIs in patients undergoing colorectal surgery at single tertiary care institution. We illustrate how the use of EMR aids in the implementation and the ability to easily record and track compliance that leads to dramatic reductions in the incidence of SSI during colon surgery.

P552 Table 1

	Number	Percent
Total Number	106	
Females	44	41.5
Males	62	58.5
Responders	60	56.6
Females	24	40
Males	36	60
Average duration of Prophylaxis (Days)	25.3	
Compliant	42	70
Females	16	38.1
Males	26	61.9
Non-compliant	18	30
Reasons for Non-compliance		
Did not receive injection	7	11.6
Ambulatory	4	6.6
Stopped after developing jaundice	1	1.6
Did not like needles	1	1.6
Advised to stop on follow up	2	3.3
Afraid of side-effects	2	3.3
Forgot	2	3.3
Side-effects	1	1.6
Operative Procedures		
Open	18	30
Laparoscopic	42	70
Lap converted to open	3	5
Abdominal Perineal Resection	3	5
Total Proctocolectomy	4	6.6
Partial colectomy	34	56.6

Methods/Interventions: Reading Hospital is a 700+ bed tertiary care center that performs over 25,000 surgeries per year and approximately 280 colon cases annually. In 2015 our institution had an increase in the rate of SSI in colorectal surgeries which resulted in an increased Standardized Infection Ratio (SIR). This prompted our institution to reevaluate their practices and initiate a Colon Bundle to reduce SSI. A multidisciplinary team made up of the Chief of Surgery, quality improvement coordinators, EMR staff, environmental services and periop leadership, evaluated the processes and reviewed best practice guidelines/prevention bundles at other high performing institutions to form their own Bundle. The Colon Bundle consists of pre-, intra- and post- operative features (Figure 1A) including; standardized preoperative bowel prep, hair removal outside of OR, CHG prep, intraoperative wound protectors, incision closing protocol (redraping, rescrubbing, changing of gown and gloves as well as new instruments). The benefit to this bundle focuses on continued surveillance of compliance with the incorporation directly into the EMR system. Intraoperative nursing staff are required to document key components of the bundle as part of their intraoperative paperwork (Figure 1B). This allows for generated monthly reports that track surgeon specific compliance and details where fallouts have occurred which allows for immediate reporting to surgeons. This also provides the opportunity for quickly addressing areas where hospital staff are not adhering to their portions of the bundle and a way to address why compliance is low for a given feature.

Results/Outcome(s): The rate of SSI in 2015, prior to implementation of the Colon Bundle, was 7.82% for 243 elective and emergent colon cases with a SIR of 2.431. The bundle was implemented in December 2015 and the rate of SSI dropped to 3.52% with a SIR of 1.25 in 2016. The infection rate continued to drop the next year, 2017, to 1.96% with a decrease in SIR to 0.68. When compliance was evaluated for the specific bundle components the majority of these showed an overall increase between July 2017 and September 2018. Adherence to the elements of the intraoperative closure portion of the bundle went from an average of 93% to 97%, use of a wound protector went from 85% to 90%. Preoperative use of CHG wipes went from a compliance of 89% to 92%. There were a few areas that compliance decreased over time, including changing of gown and gloves intraoperatively at the initiation of closing from 99% to 97% and use of new instruments intraoperatively when closing the wound went from 98% to 96%.

Conclusions/Discussion: The implementation of a detailed and unique colon bundle at this tertiary care center dramatically reduced the incidence of SSI. Ongoing surveillance of compliance is tracked through the EMR allowing for immediate recognition of fall outs, reporting of SSI directly to the surgeons and a way to quickly address issues with compliance. We show here that EMR is a

helpful tool to track compliance and can be used effectively to improve adherence to specific aspects of a Colon Bundle in order to effectively reduce SSI.

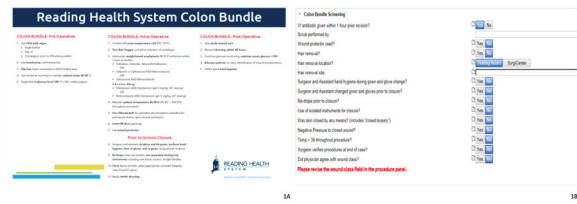


Figure 1

A NOVEL METHOD OF DETERMINING WAYS TO IMPROVE THE QUALITY OF COLORECTAL SERVICES PROVIDED IN A LARGE UNIVERSITY-BASED COLON AND RECTAL CLINIC.

P554

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Purpose/Background: There are numerous methods of determining the quality of the service provided to the colorectal patient population, however, feedback from patients is often lacking, making it difficult to assess what areas of patient care need improvement. Studying the phone call messages received by the answering service can help identify the most common questions and problems facing a busy colorectal practice and how they can be used to measure the outcomes after implementation of new protocols.

Methods/Interventions: Phone call messages received by the answering service of a busy university colon and rectal clinic employing 12 surgeons were reviewed for a period of one year (1/1/2017 to 1/31/2017). The majority of these phone calls came from the hospital and patients during nonbusiness hours. The nature of the calls and their frequency were analyzed.

Results/Outcome(s): Between January 1st and December 31st an average of 489 phone calls was received every month by the answering service. Of these, 72% contained a message and 28% were dropped phone calls. Most phone calls (20.5%) were regarding patient orders, followed by complaints of pain requiring medication (13.5%) and problems with filling out prescriptions (6%).

Conclusions/Discussion: Physician orders, pain management concerns, and difficulty with prescriptions present the majority of the phone calls in our colon and rectal surgery group. Since the study period, we have begun protocols to improve pain control at home and minimize problems with filling the prescriptions. We plan on using these data as a baseline in measuring the effectiveness of the implementation of these changes over the next year.

INCOMPLETE COLONOSCOPY, WHAT HAPPENS NEXT? A MULTICENTER REVIEW.

P555

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Purpose/Background: Colonoscopy remains the most widely used screening modality for detection of colon polyps and prevention of colorectal cancer (CRC). It is important to perform a complete colonoscopy in order to identify all colonic lesions, therefore reducing the risk of CRC. In order to adequately evaluate the colon during colonoscopy, cecal intubation with identification of the cecal landmarks needs to be performed. Various international guidelines recommend a cecal intubation rate of $\geq 90\%$ for all cases and $\geq 95\%$ for CRC screening or colon polyp surveillance. Incomplete colonoscopy rates vary from 4% to 25%. Patients who did not undergo complete endoscopic evaluation require complete mucosal examination using other screening modalities. The current recommendations state that a second attempt at conventional colonoscopy, CT colonography, or colon capsule endoscopy may be performed to fully examine the colon. The primary aim is to evaluate the frequency and type of follow up examination after incomplete colonoscopy.

Methods/Interventions: This is a multi-center retrospective chart review analysis of patients who underwent colonoscopy examination at three different institutions: an academic center; an inner city county hospital, and a private, suburban, tertiary center. The data was collected for the period between January 2013 and September 2018. Retrospective chart review included demographics, indication for colonoscopy, reason for incomplete examination, type of follow up examination and the time between the incomplete and follow up examinations. Inclusion criteria consisted of all patients who underwent an incomplete colonoscopy at three different institutions and the examination was performed by either a GI or colorectal service.

Results/Outcome(s): A total of 354 patients (57% female) underwent an incomplete colonoscopy at three different institutions. Mean patient age (56.2 years) significantly varied at three different institutions with 62.2 ± 17.7 years at a private hospital, 54.8 ± 12.6 years at an academic center and 57.8 ± 10.3 years at a county hospital ($p=0.003$). The most common indication for the initial colonoscopy was diagnostic (43%) followed by screening (42%), and surveillance (15%). Upon the initial examination, the most common reason for an incomplete examination was inadequate bowel preparation (67%) followed by colonic tortuosity (10%) and patient's intolerance (7%). Among all patients who underwent incomplete colonoscopies, 224 patients (63%) had some form of follow up. There was no difference in the percentage of patients who were lost to follow up between the three institutions. ($p=0.438$) Out of 224 patients with a follow up examination, 186 (186/224,

83%) underwent repeat colonoscopy at a different time. The remaining cohort of patients had double contrast barium enema (BE) (10%, 22/224), CT colonography (3%, 7/224), and flexible sigmoidoscopy (1.3%, 3/224) as the most commonly performed examinations. The remainder of the patients with incomplete colonoscopies were not re-evaluated due to findings requiring surgery or metastatic disease. The choice of follow up examinations varied significantly among the three institutions. Repeat colonoscopy was found to be the follow up exam of choice ($p=0.001$), while at the inner city county hospital, BE was performed more frequently ($p<0.001$). The time between the initial incomplete colonoscopy and follow up examination significantly differed between the three institutions. At the private hospital, the mean follow up time was 51.9 ± 85.1 days whereas at the academic center it was 111.7 ± 176.4 days and at the inner city county hospital, the mean time was 67.2 ± 49.2 ($p=0.048$). Among 186 repeat colonoscopies, 54 examinations (29%, 54/186) demonstrated a diagnostic finding based on the biopsy results from the repeat colonoscopy including 3 malignant findings and 51 benign pathologies. The remaining examinations were either endoscopically normal, not requiring biopsy or incomplete. BE and CT colonography yielded normal results.

Conclusions/Discussion: Complete colonoscopy is essential to ensure high quality examination of the colon. In order to achieve the recommended 90% completion quality benchmark for colonoscopy, it is important to anticipate the potential pitfalls and factors potentially contributing to a difficult exam. More than one third of patients with incomplete colonoscopies, in this population, did not have follow up colon evaluations at our institutions. Also, out of the 46% of patients who did have a follow up colonoscopy, 29% had abnormal biopsies at their repeat colonoscopy. Even though it is possible that a number of patients had repeat evaluations at other institutions, we recommend that new patient education modalities are developed and that system approaches are applied to increase the likelihood of repeat colon evaluation after incomplete colonoscopy.

IMPACT OF INTRODUCTION OF A SECOND ROBOTIC SURGICAL SYSTEM ON THE ROBOTIC CASE VOLUMES AT AN ACADEMIC SURGICAL CENTER.

P556

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Purpose/Background: As new surgical robotic systems are developed, surgeons and hospitals that have existing robotic surgical capabilities face difficult decisions as to whether to invest the financial resources and time into adding an additional robotic system. Concern over whether adding a new system will detract from the volumes of the existing system, thereby increasing total robotic surgical cost

without increasing total robotic surgical volume, may lead some surgeons and hospitals away from introducing new robotic systems. In order to study this, we looked at changes in Intuitive da Vinci case volumes before and after introduction of a novel robotic platform, the Medrobotics Flex Robotic System with optional Colorectal Drive. The Flex Robotic System is a transoral or transanal approach (with the Colorectal Drive for insufflation) with fully articulating instruments to address pathology oropharynx or rectum.

Methods/Interventions: Case volumes for procedures that utilized the Intuitive da Vinci Si Surgical System and the Medrobotics Flex with optional Colorectal Drive were looked at from July 2014 through June 2018 for the departments of Otolaryngology and Colorectal Surgery. These years were chosen as they covered the three years before and one year after introduction of the Medrobotics Flex Robotic System. Volumes were looked at by attending surgeon and by specialty. The case volumes for procedures that utilized the Flex Robot were then broken down by six-month period, department, and attending.

Results/Outcome(s): For the Colorectal Department, da Vinci surgical volumes remained within the range of the previous years with the introduction of the Flex Robotic System (previously 34-43 cases per six-month period before introduction, 35-45 cases after introduction) Figure 1. For the Department of Otolaryngology, da Vinci Case volume initially decreased with the introduction of the Flex Robotic System, but subsequently increased significantly (9-14 cases per six-month period before introduction, 5-10 cases after introduction) Figure 2. The introduction of the Flex Robotic system also coincided with the retirement of an active da Vinci Robotic System, further suppressing initial numbers after Flex introduction. Flex robotic surgical case volume increased for both departments over time.

Conclusions/Discussion: Introduction of a second, complementary robotic surgical system increased total robotic surgical volumes and did not decrease surgical volumes of the first robotic surgical system. Addition of a second system broadened the scope of surgeries able to be performed, increased total case volumes, and strengthened the overall robotic surgical program.

COMPLETENESS OF NARRATIVE OPERATIVE REPORTS FOR RECTAL CANCER SURGERY.

P557

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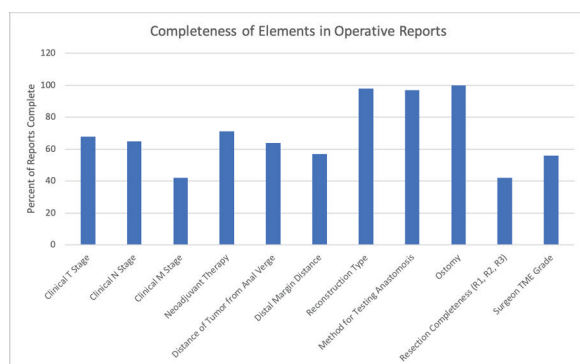
Purpose/Background: Synoptic operative reporting has been shown to improve completeness and consistency in surgical documentation. This can be an essential step in quality improvement efforts. For rectal cancer, use of a synoptic operative report has been recommended for hospitals seeking accreditation through the National

Accreditation Program for Rectal Cancer (NAPRC). The goal of this study was to determine to what extent current operative reports contain the key clinical elements recommended by the NAPRC.

Methods/Interventions: Rectal cancer surgeons from nine hospitals across the state of Michigan submitted operative reports for rectal cancer resections from June – October 2018. The operative reports were compared to the elements in the NAPRC synoptic operative template for completeness in reporting.

Results/Outcome(s): In total, 65 operative reports were reviewed. Twelve (18%) contained all 23 recommended elements; these reports used a synoptic template. Results for key elements are presented in the figure. The most commonly documented elements included: whether a stoma was made (100% of reports complete), type of reconstruction (98%), and testing method of the anastomosis (97%). Overall, 68% of notes included a clinical T stage, 64% included an N stage, and 42% included an M stage. Forty-two percent reported completeness of the resection (R0, R1, or R2), and 56% reported the quality of the mesorectal excision. Thirty-six percent did not mention height of the tumor from the anal verge.

Conclusions/Discussion: Narrative operative reports do not consistently document important information for rectal cancer resection. This study provides evidence that synoptic operative reporting, as recommended by the NAPRC, will improve quality of documentation for rectal cancer surgery.



CHARACTERISTICS, OUTCOMES, AND TRENDS IN COLORECTAL SURGERY IN U.S. VETERANS, A 10-YEAR EXPERIENCE AT A TERTIARY VETERANS AFFAIRS MEDICAL CENTER.

P558

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Purpose/Background: The past decade has witnessed numerous advances in colon and rectal surgery, arising from the increasing utilization of minimally invasive surgery approaches, implementation of evidence-based enhanced recovery programs, and a growing emphasis on

patient-centered outcomes. The purpose of this study is to benchmark outcomes and experiences of patients undergoing colorectal surgery at a tertiary Veterans Affairs Medical Center over a 10-year period.

Methods/Interventions: Veterans who underwent a non-emergent, intraabdominal colorectal procedure between 2008 and 2018 were identified using targeted CPT codes and the Computerized Patient Record System (CPRS). Patient outcomes were captured using the Veterans Affairs Surgical Quality Improvement Program (VASQIP) and focused on length of stay and aggregate postoperative morbidity profiles.

Results/Outcome(s): We identified 324 patients over the study period who underwent elective colon/rectal resection at our medical center. Of these cases, 89% were colectomy (25% laparoscopic) based on CPT codes; 95% of patients were male and the average age was 66 years old. The median length of stay following surgery was 8 days (range one to 237 days). Within the 30-day postoperative period, the composite morbidity score was 24.1%; most notable being superficial surgical site infections (6.5%), wound dehiscence (4.6%) and pneumonia (3.1%). Median predicted morbidity across this cohort based on VASQIP risk algorithms indicated that patients had a 24.32% change of a postoperative morbidity following a colon/rectal resection at a Veterans Affairs Medical Center.

Conclusions/Discussion: Cataloging this decade of practice has helped reflect on practice changes in the field of colon and rectal surgery and in the treatment of veterans. Moving forward, tracking outcomes independently with verification with VASQIP reporting will be very important in benchmarking improvements when implementing new practice models.

PALLIATIVE CARE DELIVERY TO PATIENTS WITH ADVANCED APPENDICEAL ADENOCARCINOMA: ARE WE DOING ENOUGH?

P559

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Purpose/Background: In 2012, the American Society of Clinical Oncology (ASCO) established guidelines which recommend integrated palliative care (PC) delivery alongside standard oncology care within eight weeks of diagnosis for all patients with advanced cancer. PC, aimed at improving quality of life and reducing suffering, is associated with reduced healthcare utilization and improved patient-reported outcomes without impacting survival in advanced cancer. However, adherence to PC guidelines has not yet been evaluated among patients with advanced stage appendiceal adenocarcinoma, a rare disease with poorly defined treatment guidelines. Our objective was to determine the rate and patterns of PC delivery to this

population using novel natural language processing (NLP) methods and examine independent factors associated with PC delivery.

Methods/Interventions: Patients diagnosed with advanced stage appendiceal adenocarcinoma from January 2012 to June 2018 at two comprehensive cancer centers were included. Advanced stage disease was defined as having metastatic disease beyond regional involvement or evidence of peritoneal involvement confirmed by pathology report. PC delivery within eight weeks of advanced stage diagnosis was measured from electronic health record notes using NLP, a novel form of computer-assisted data abstraction. NLP identified PC by using previously validated key phrases for one of four PC process measures endorsed by the National Quality Forum: code status clarification, goals of care discussion, specialist PC consultation, and hospice evaluation. Logistic regression was used to identify patient and tumor factors associated with PC delivery.

Results/Outcome(s): Of 116 patients identified, 2,629 notes were reviewed using NLP. The median age was 62 years (IQR 52-69), 50% were female, the majority of patients were White and English-speaking, and 3% had a billing for PC prior to diagnosis with advanced disease. With regard to pathology, 30% of tumors exhibited signet-ring cell histology, 55% had mucinous features, and 30% had high-grade features. NLP identified PC delivery in 15 (13%) patients. Code status clarification was most common (11%), while 5% had documentation of goals of care, 7% received a specialist PC consult, and 3% were evaluated for hospice. In contrast, administrative coding identified billing for PC in six (5%) patients. Age was the sole independent factor associated with PC delivery within recommended guidelines (Odds Ratio: 1.05, 95% Confidence Interval: 1.01-1.09, $p=0.04$).

Conclusions/Discussion: NLP represents a novel and practical method for measuring PC delivery. PC remains inadequately delivered to patients with advanced stage appendiceal adenocarcinoma. Interventions to increase PC delivery to these patients are urgently needed to meet ASCO PC guidelines.

ERAS AFTER COLORECTAL SURGERY IN ONTARIO, CANADA. A PROVINCIAL ASSESSMENT OF THE CURRENT PERIOPERATIVE PRACTICE, BARRIERS, AND UTILIZATION OF ERAS PROTOCOLS.

P560

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Purpose/Background: Enhanced recovery after surgery (ERAS) protocols following colorectal surgery utilize several perioperative interventions that have been shown to decrease morbidity, length of stay and improve patient

satisfaction. ERAS is increasingly being considered standard of care following colorectal surgery, however several earlier studies have demonstrated relatively low uptake of formalized protocols and significant practice variability in the perioperative period. The purpose of this study was to pragmatically characterize variations in the specific ERAS practices utilized by general surgeons performing colon and rectal surgery. Further, to characterize the provincial rates of ERAS utilization and identify the specific barriers and limitations to ERAS implementation in all hospital settings.

Methods/Interventions: 797 general surgeons, were identified through the College of Physicians and Surgeons of Ontario. A survey identifying demographics, rates of ERAS utilization and barriers to implementation was distributed. Logistic regression determined the effects of demographic and hospital covariates on ERAS utilization. Qualitative analysis assessed barriers to implementation.

Results/Outcome(s): 235 (30%) general surgeons representing 84 (56%) of Ontario hospitals participated, which cover more than 90% of colorectal procedures performed. Surgeons working in academic or large community hospitals represented the majority of the cohort (30.5% & 47.2% respectively). Nine specific perioperative ERAS behaviors were analyzed. Advancement of diet on postoperative day 0, restriction of intravenous fluids and having a protocol for catheters and lines were significantly higher in surgeons who follow ERAS protocols compared to those who do not (73.5% vs 54% $p=0.004$; 92% vs 79.7% $p=0.01$; 91% vs 40.6% $p<0.001$ respectively). Interestingly, 4% of surgeons still utilize postoperative prophylactic nasogastric drainage. Multivariable linear regression demonstrated that having a colorectal fellowship or being exposed to ERAS during training did not have a significant effect on utilizing ERAS principles (0.32, 95%CI -0.31-0.94 $p=0.155$; 0.28, 95%CI -0.26-0.82 $p=0.155$ respectively). Furthermore, there was no significant effect of surgeon demographics, years in practice, or training details on ERAS protocol utilization, however practicing in small community hospitals (compared to large/academic hospitals) was significantly associated with not using an ERAS protocol (OR 0.02, 95% CI 0-0.3, $P=0.005$). Over 50% of respondents did not use a formal ERAS protocol, however used ERAS principles. Independent of using a formal ERAS protocol, academic surgeons used on average, 1 more ERAS behavior compared to small community surgeons (0.86, 95%CI 0.42-1.31 $p<0.001$) and having a standardized ERAS order set was the most significant factor influencing adherence to ERAS behaviors (1.67, 95%CI 1.16-2.2 $p<0.001$). Several barriers to implementing ERAS protocols were identified and included patient variability, lack of institutional and nursing support, poor communication with the care team and financial constraints.

Conclusions/Discussion: Despite the evidence demonstrating the benefits of ERAS protocols, there is still significant variation in perioperative colorectal surgery practice. The majority of Ontario general surgeons practicing colon

and rectal surgery do not use formalized ERAS protocols, however use individual principles. Small community hospitals are less likely to utilize formal ERAS protocols and having colorectal fellowship training does not increase overall utilization. Adherence to ERAS protocols is independent of fellowship training or ERAS exposure during training. This unique large scale provincial assessment of general surgeons is the first to pragmatically assess how the majority of colon and rectal surgery patients are managed in the perioperative period in a large Canadian province. It therefore informs ongoing quality improvement efforts in the delivery of colorectal surgery care. Based on the identified barriers to implementation, the present study also provides pragmatic evidence based solutions to increase ERAS utilization and compliance amongst both community and academic surgeons.

ANASTOMOTIC LEAK BEFORE AND AFTER HOSPITAL DISCHARGE: IS THERE ANY DIFFERENCE IN CLINICAL OUTCOME?

P561

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Purpose/Background: Nowadays, the length of hospital stay after colorectal surgery tends to be reduced. Anastomotic leak is the most relevant complication after this procedure. The time elapsed of its presentation is variable and may occur even after hospital discharged. It is not clear if there any difference in outcome if this complication occurs during or after hospitalization. The objective of this study is to evaluate differences in outcome of patient who have had anastomotic leak during or after hospital discharged.

Methods/Interventions: A series of patients who underwent elective colorectal surgery was analyzed from a prospective data base since 2008 to 2018. Patients with laparoscopic colorectal resection without diverted ostomy were included. The series was divided into two groups according to the time of anastomotic leak was diagnosed; G1: Anatomotic leak during hospitalization and G2: After hospital discharged. The peritonitis due to the leak was classified as Mild (M): Turbid liquid localized in one quadrant or Severe (S): purulent or fecal liquid localized in more than one quadrant. Morbidity was described using Clavien-Dindo classification.

Results/Outcome(s): 1158 colorectal surgeries were performed during the period of time analyzed. From those, 853 met the inclusion criteria. The anastmotic leak rate was 7 % (60 patients) and its diagnosis was higher during the hospitalization (G1: n 49 (82%) vs G2: n 11 (18%); $p < 0.05$). The were no differences in sex, age, BMI, and ASA score between the groups. In all cases the treatment was a reoperation, washout the abdominal cavity and a loop diverting ileostomy. The were no difference in the

distribution of type of peritonitis found between the groups. The time elapsed to perform the second surgery was longer in G2 (G1: 4 days vs G2: 9 days; $p < 0.05$). Although the hospital stay was longer in G2 there were no differences in morbidity rate between the groups (G1:12 days vs G2 21 days; $p < 0.05$)

Conclusions/Discussion: Patients who develop anastomotic leak once hospital discharge have a delay in diagnosis but this does not increase the risk of more severe peritonitis or a higher rate of complications.

CURRENT GRADING SYSTEMS OF ACUTE AND CHRONIC DIVERTICULITIS ARE NOT CORRELATIVE OF OPERATIVE DURATION OR HOSPITAL COSTS.

P562

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Purpose/Background: The incidence of diverticulitis continues to rise each year. There are two current systems for grading disease severity of diverticulitis: modified Hinchey and American Association for Surgery in Trauma [AAST]. The goal of the study is to discern if the current grading systems are predictive of operative duration and overall hospital costs in treating acute or chronic diverticulitis.

Methods/Interventions: This is a retrospective cohort study at a single institution, University of Kentucky (UK), and its National Surgical Quality Improvement Program (NSQIP) database was used to identify patients who developed diverticulitis and were treated between 1/1/2012 to 12/31/2017. Patients were divided into acute or chronic diverticulitis presentation to compare differences in clinical outcomes after treatment by either acute care surgery or colorectal surgery after adjusting for patient presentation and clinical risk factors.

Results/Outcome(s): 248 patients over a five year span underwent surgical treatment for acute or chronic diverticulitis. 34% [N=85] underwent operative intervention for acute emergent and acute non-emergent diverticulitis. When evaluating for cost outcomes for both the modified Hinchey and the AAST classification systems, regression models reveal that both classification systems do not correlate with costs ($p = 0.105$ and $p = 0.123$ respectively). 84.3% of chronic diverticulitis were treated by CRS whereas 67.4% of acute diverticulitis were treated by ACS ($p < 0.001$). The vast majority of ACS patients were treated emergently (83.1%, $p < 0.001$) and were more likely to present with sepsis compared to their CRS counterparts ($p < 0.001$). Median total costs were higher for the ACS group (\$24.4k vs. \$15.9k, $p < 0.001$), but this difference was insignificant after adjusting for patients' clinical factors ($p = 0.98$).

Conclusions/Discussion: Hinchey classification and AAST diverticulitis grade are not valid predictors of operative duration and hospital costs. With our reimbursement system becoming more strongly associated with patient outcomes, it is imperative to have improved pre-operative grading systems to better predict disease severity, outcomes, and overall costs of treatments.

PATIENT-PROVIDER GENDER PREFERENCE IN COLORECTAL SURGERY.

P563

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Purpose/Background: Patient-provider gender preferences have been shown in fields such as gastroenterology and obstetrics and gynecology where sensitive exams are prevalent. Colorectal surgery is drawing an increasing number of women into the specialty, thereby providing patients with another parameter with which to choose a provider. Based on trends seen in these other specialties, we aimed to determine the frequency at which patients voice a preference for a gender-specific surgeon. We hypothesized that gender preference would be more common for new patients being seen for anorectal disease than benign and malignant diseases of the colon and rectum.

Methods/Interventions: A prospective observational study was performed over 3 weeks at a tertiary referral academic medical center. Schedulers in the department of colon & rectal surgery identified all new patient calls and recorded factors influencing patient selection of surgeon based on information volunteered by patients. To ensure that schedulers were not soliciting information from patients, a neutral observer listened to schedulers handle incoming calls in the weeks prior. A two week trial period was also performed to ensure that schedulers were able to track all calls. Additional demographic information was obtained from the medical record, and descriptive statistics performed.

Results/Outcome(s): There were 60 new patients scheduled; 35 (58.3%) female and 25 (41.7%) male. The mean age was 51.8 years (SD 16.8). The most common reason for scheduling was benign anorectal disease (31; 51.7%), followed by malignant colorectal disease (13; 21.7%), benign colorectal disease (11; 18.3%), pelvic floor (3; 5%) and colonoscopy (2; 3%). Ten of 60 patients (16.7%) expressed the desire to see a surgeon of a certain gender as their primary factor in scheduling; 6 female patients requested a female surgeon and 1 requested a male, while 2 male patients requested a male surgeons and 1 requested a female. All requests were accommodated. Seven (70%) of those who chose a specific gender were being seen for anorectal disease (5 female, 2 male). There was no significant difference between those patients who chose a gender-specific surgeon by age, race or marital status. Of those who did not choose their provider based

on gender, referral to a particular surgeon (15; 25.0%) was the most common factor, followed by scheduling a "first available" appointment (13; 21.7%) and practice location (8; 13.3%). The remaining 12 did not have a specific factor that was evident to the scheduler.

Conclusions/Discussion: A substantial percentage of patients request a surgeon of a certain gender when seeking treatment for anorectal disease. Rather than uncovering an implicit bias, this study highlights the sensitive nature of the problems treated by colorectal surgeons, and quantifies an underlying assumption that some patients may feel more comfortable being treated by a surgeon of a certain gender. This information could be used to justify diversification within departments and in different practice settings in order to best serve the preferences of patients.

EARLY ORAL OPIATE ADMINISTRATION AS PART OF AN ENHANCED RECOVERY AFTER SURGERY PROTOCOL DECREASES OVERALL OPIATE CONSUMPTION AS COMPARED TO INTRAVENOUS PATIENT CONTROLLED ANALGESIA.

P564

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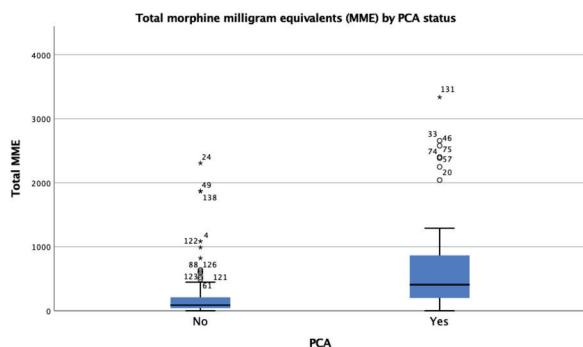
Purpose/Background: Multimodality opioid sparing analgesic regimens are a pillar of enhanced recovery after surgery (ERAS) protocols which have been shown to improve patient outcomes across a variety of metrics. A number of strategies to mitigate narcotic use have been employed though the optimal route of narcotic administration in the early postoperative period has not been defined. We hypothesized that early, as needed oral opiate administration as part of a multimodal analgesic regimen would provide acceptable analgesia in the context of an early postoperative feeding program. The aim of this study was to evaluate the impact of early oral opiate (PO) administration on overall opiate consumption, analgesia and length of stay as compared to intravenous patient controlled analgesic (IV PCA) opiate administration.

Methods/Interventions: For this single institution retrospective review, we identified all patients undergoing abdominal colorectal surgery for whom data was prospectively collected as part of a statewide quality collaborative from August 2017 to March 2018. Prior to August 2017, patients received a multimodal analgesic regimen including routine postoperative IV PCA. After this period, patients received a multimodal analgesic regimen including either IV PCA or oral opiates at the discretion of the operating surgeon. We compared the PCA group to the PO group with respect to overall opiate consumption, postoperative pain scores and length of stay on the index admission.

Results/Outcome(s): We identified 152 patients meeting study criteria of which 75 (49%) were female. The PCA and PO groups did not differ with respect to age,

gender or major medical comorbidities. The PCA group more frequently underwent open surgery as compared to the PO group (39% vs. 23%; $p=0.04$). Regional blocks were utilized similarly between groups (PCA vs. PO: 81% vs. 80%; $p=0.84$). Epidural usage was minimal in both groups (PCA vs. PO: 9% vs. 2%; $p=0.11$). Mean opiate utilization measured in morphine milligram equivalents (MME) was decreased in the PO group (PCA vs. PO: 689 vs. 226 MME; $p<0.01$) while mean pain scores on a 0-10 scale on postoperative days 1 (PCA vs. PO: 5.0 vs. 4.3; $p=2.1$) and 2 (PCA vs. PO: 4.6 vs. 4.0; $p=0.29$) were similar. Mean length of stay was similar between groups (PCA vs. PO: 7.2 vs. 5.4 days; $p=0.08$).

Conclusions/Discussion: Early oral narcotic administration as part of an ERAS protocol is feasible with adequate analgesic effect and decreased overall opiate consumption. Consideration should be given to early oral narcotic administration as a means of reducing inpatient opiate consumption. Future directions include prospective study of the impact of early oral opiate requirements.



MANAGEMENT OF FOLEY CATHETER AFTER COLOVESICULAR FISTULA TAKEDOWN FOR BENIGN DISEASE.

P565

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Purpose/Background: Colovesicular fistula (CVF) arising from diverticular disease frequently requires surgical. Current literature varies greatly regarding post-operative management of indwelling urinary drainage catheters. The purpose of this study was to further evaluate the role and timing of post-operative bladder imaging studies and early Foley catheter removal.

Methods/Interventions: Patients who underwent surgical management of CVF at a tertiary referral center were retrospectively analyzed. All patients were over 18 with no history of chronic indwelling urinary catheter use, and no history of intra-abdominal malignancy. Surgical management encompassed any operative intervention involving takedown of the CVF, with or without colon resection. Records were reviewed for post-operative urinary catheter management, post-operative bladder

imaging, duration of urinary catheterization, involvement of the urology service, rate of urine leak, and rate of other bladder-related complications. Secondary characteristics reviewed included patient demographics, past medical history, ASA, and initial Hinchey classification of diverticulitis. Statistical analysis was performed using 2-tailed t-test for continuous variables, and chi-squared or Fisher's Exact test for categorical data.

Results/Outcome(s): Initially, 47 patients were identified with surgically treated CVF. Ultimately, 28 patients were included for review after excluding patients with CVF due to malignancy and patients lacking accessible operative documentation or follow up. Overall, 9 patients had short Foley duration of <10 days and 17 had long Foley duration ≥ 10 days (mean 4.6 ± 2.0 vs 23.3 ± 12.5 days; $p<0.0001$). There were no instances of bladder leak after Foley removal in either group, and no readmissions or complications related to urine leak. Urine leaks were identified on imaging in 5 of 25 patients who underwent cystogram prior to Foley removal; none in the short duration Foley group and five in the long group. Three of these patients went on to have resolution of bladder leak on subsequent imaging study and no urinary complications after Foley removal. The other two patients have Foley catheters still in place. Visible bladder defects were identified intraoperatively in one short Foley (11.1%) and eight long Foley duration patients (47.1%). All of these patients underwent repair in the form of cystorrhaphy. Of the 9 patients with visible bladder defects, two had evidence of persistent leak on follow up imaging (22.2% vs 18.8%; $p=1$). In comparison, 19 patients had no visible bladder defects intraoperatively and three showed evidence of persistent urinary leak on postoperative imaging (15.8%). All but three patients underwent post-operative imaging prior to Foley removal, in the form of CT cystogram (17/28), XR cystogram (7/28), or both (2/28). None of the three patients without imaging prior to Foley removal had visible intra-operative bladder defects. These patients underwent Foley catheter removal on post-operative days 5, 11, and 18 without complications. Overall, there were no significant differences in postoperative leak rate based on intra-operative identification of bladder defect (22.22% vs ; $p=1$) or use of methylene blue leak test (16.67% vs 18.1%; $p=1$). Evidence of bladder leak on imaging was found in two of 14 patients who had cystorrhaphy (14.2%) compared to three of 14 without cystorrhaphy (21.4%; $p=1$).

Conclusions/Discussion: CVF management represents a unique challenge for colorectal surgeons. Post-operative urine leak can be minimized with appropriate use of imaging studies and Foley catheter. Despite their clinical utility, intra-operative findings of bladder defect, methylene blue leak test, and bladder repair were not predictors of leak on post-operative imaging. Early versus late Foley catheter removal does not appear to affect subsequent bladder leak.

INCREASING RATES OF COLON AND RECTAL CANCER AMONG THE YOUNGER POPULATION IN SWEDEN.

P566

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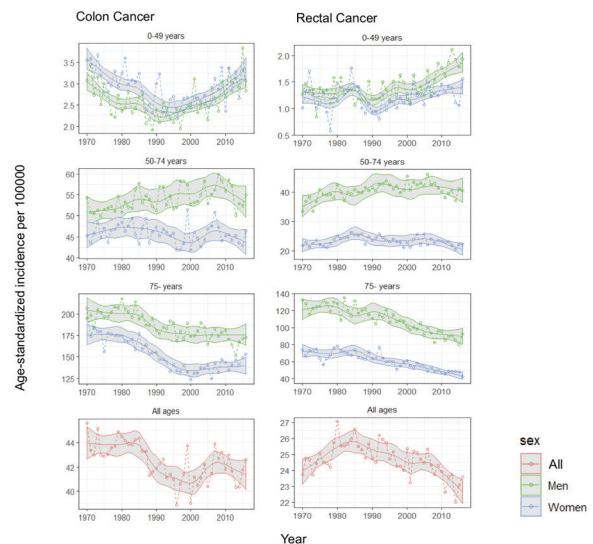
Purpose/Background: The aim of this study was to characterize the trends in overall- and age-specific incidence of colorectal cancer in Sweden over time. The current evidence regarding the incidence of colorectal cancer suggests differences across countries. The incidence of colorectal cancer in patients under the age of 50 appears to be increasing in the Western world. Little is known regarding variations in overall-, sex- and age-specific incidence of colorectal cancer over time in Sweden.

Methods/Interventions: The study population consisted of the entire population of Sweden 1970-2016. The number of cases was based on patients identified in the Swedish Cancer Registry with colon and rectal cancer. The primary aim was to characterize the overall incidence, as well as the sex- and age-related incidence of colorectal cancer in Sweden during the study period. Secondary aims were to characterize tumor localization and tumor stage at the time of diagnosis. Incidence rates were age-adjusted to the European Standard Population, 1976. The incidence was assessed over time by restricted cubic splines and the average annual percentage change was estimated by linear regression.

Results/Outcome(s): An overall decrease was observed in the incidence of colorectal cancer during the last decade 2006-2016, with an average annual decrease of 0.5% (95%CI 0.93-0.08). Although uncommon in the younger population, (6% of all patients with colorectal cancer) an increase in incidence was seen in both colon and rectal cancer among patients younger than 50 years of age. Young women had the highest increase in incidence of both proximal and distal colon, as well as rectal cancer, with an average annual percentage increase of 2.3% (95% CI 0.76-3.85) 1995-2005 and 3.3% (95% CI 0.98-5.62) 1995-2005 respectively. This increase continued 2006-2016, in colon cancer the average annual percentage rate increased by 2.5% (95% CI -0.32-5.37) and in rectal cancer by 1.9% (95% CI -0.88-4.7). Furthermore, patients under the age of 50 were more likely to present with more advanced disease, 61% of patients below 50 years compared to 56% in the 50-74 age-group and 50% in the 75+ age-group, respectively. Considerable fluctuations in incidence rates were seen over time among all age groups.

Conclusions/Discussion: From 1970-2016, the overall incidence of CRC in Sweden decreased. However, the incidence of proximal and distal colon cancer, as well as rectal cancer increased in patients under 50 years of age, especially in women. These findings are of concern and need to be considered in the clinical context. Moreover,

the factors affecting increasing incidence rates are not fully understood and require further investigation.



PATHOLOGIC OUTCOMES FOLLOWING LAPAROSCOPIC AND OPEN SURGERY FOR RECTAL CANCER: A CONTEMPORARY CANADIAN MULTI-CENTER EXPERIENCE.

P567

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Purpose/Background: In recent years the role of laparoscopy in rectal cancer surgery has been debated. The inconclusive results of two recent non-inferiority randomized control trials comparing composite pathologic outcomes has prompted further evaluation of the technique. To date, limited contemporary multi-center data exists evaluating laparoscopy for rectal cancer in a "real world" setting. The Canadian Partnership Against Cancer (CPAC) Rectal Cancer Project is a quality initiative designed to evaluate the quality of rectal cancer care across high volume rectal cancer centers in Canada. In this study we use prospectively collected data from this quality improvement initiative to compare pathologic outcomes following laparoscopic and open rectal cancer surgery.

Methods/Interventions: Over a two-year study period, pre-operative, surgical, radiologic and pathologic process measures were collected for patients with primary pre-operative stage I-III rectal cancers from 9 centers across Canada. Available patient demographics, surgical details, pathologic tumor characteristics and pathologic outcomes were abstracted from the prospectively maintained database.

Cases were stratified based on surgical approach (laparoscopic vs open). Cohort characteristics were summarized as means with standard deviation for continuous variables and frequencies with percentages for categorical variables. Bivariate analysis was used to compare pCRT use, tumor characteristics and pathologic outcomes between groups. Continuous and categorical variables were compared with Student's t-test or Fisher's exact test respectively with $p < 0.05$ statistically significant. A mixed effects multivariable logistic regression model was developed to determine the effect of surgical approach on pathologic outcomes while adjusting for center effect, treatment and tumor characteristics. All analysis was performed using Stata (Version 13.1, StataCorp).

Results/Outcome(s): Between April 2015 and December 2016, 645 patients with primary Stage I-III rectal cancer underwent TME surgery. 21 patients were excluded due to incomplete pathology records leaving 624 patients within the study cohort. The laparoscopic group included 382 patients and the open group included 242 patients. The groups were similar regarding age and sex (Table 1). Pre-operative chemotherapy, T3/T4 tumors, higher stage and low tumor height were more common in the open group. The overall CRM positivity rate in our cohort was 8.87%. The conversion rate in the laparoscopic group was 6.8%. On bivariate analysis there were significantly more positive CRMs in the open group (7.01% vs 11.98% $p = 0.04$). There were no significant differences between the two groups with respect to distal margin positivity or lymph node harvest. Data on TME quality was available for 493 patients within the cohort. The incomplete TME rate was also significantly higher in the open group (6.1% vs 13.3%, $p < 0.001$). After adjusting for potential confounders, surgical approach was not statistically significantly associated with CRM positivity (OR = 0.78, 95% CI 0.38-1.59) or incomplete TME (0.72, 95% CI 0.30-1.69).

Conclusions/Discussion: This study compares pathologic outcomes following laparoscopic and open surgery in primary stage I-III rectal cancer patients treated at high volume centers in a contemporary Canadian cohort. On initial bivariate analysis, we found higher CRM positivity and incomplete TME rates following open surgery, likely reflecting the more advanced and lower tumors in this group. Following multivariable regression, adjusting for site and tumor characteristics, surgical approach was no longer associated with CRM positivity or TME quality. This study demonstrates that in appropriately selected patients, laparoscopic TME surgery can be applied with low CRM positivity, conversion rates and acceptable pathologic outcomes in a real world setting outside of a clinical trial. Further analysis to evaluate short-term oncologic and peri-operative outcomes is planned.

Table 1:		Laparoscopic TME (n=382)	Open TME (n=242)	P- Value
Patient Demographics				
Age		68.8 ± 9.2	67.2 ± 7.2	0.80
Male Sex		242 (63.4%)	147 (60.7%)	0.79
Preoperative Chemoradiotherapy		181 (47.4%)	157 (64.9%)	<0.001
Conversion to Open		26 (6.8%)	N/A	
Tumor Characteristics				
Height (n=572)				0.05
	High (10-15cm)	63 (17.7%)	35 (16.2%)	
	Mid (5.1-10cm)	181 (50.8%)	94 (43.5%)	
	Low (0-5cm)	112 (31.5%)	87 (40.3%)	
T Category (pathologic)				<0.001
	T0	59 (15.5%)	26 (10.7%)	
	T1	44 (11.5%)	23 (9.3%)	
	T2	135 (35.3%)	55 (22.7%)	
	T3	135 (35.3%)	113 (46.7%)	
	T4	9 (2.4%)	25 (10.3%)	
Stage (pathologic)				0.003
	Stage 0	60 (15.7%)	26 (10.7%)	
	Stage 1	141 (36.9%)	64 (26.4%)	
	Stage 2	72 (18.9%)	60 (24.8%)	
	Stage 3	109 (28.5%)	92 (38%)	
Pathologic Outcomes				
Positive CRM		27 (7.1%)	29 (11.9%)	0.04
Positive Distal Margin		7 (1.8%)	31 (12.2%)	0.75
Number of Lymph Nodes		21.6 ± 1.3	20.3 ± 1.9	
Incomplete TME (n=493)		19 (6.1%)	19 (13.3%)	0.03
Multivariable Analysis – Factors associated with CRM +				
		<i>Odds Ratio</i>	<i>Confidence Interval</i>	
Laparoscopic Surgical Approach		0.78	0.38 - 1.59	0.49
Preoperative Chemoradiotherapy		1.3	0.66 - 2.56	0.45
T4 Tumor Stage		5.01	1.75 - 14.3	0.003
Low Rectal Tumor		3.21	1.69-6.10	<0.001
Multivariable Analysis – Factors associated with Incomplete TME				
		<i>Odds Ratio</i>	<i>Confidence Interval</i>	
Laparoscopic Surgical Approach		0.72	0.30 - 1.69	0.45
Preoperative Chemoradiotherapy		0.99	0.45 - 2.20	0.99
T4 Tumor Stage		1.03	0.21 - 5.16	0.97
Low Rectal Tumor		3.79	1.72 - 8.30	0.001

PRESERVING IRRADIATED DISTAL RECTUM BENEFIT BOWEL FUNCTION AFTER RECTAL CANCER RESECTION WITH NEOADJUVANT THERAPY.

P568

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Purpose/Background: Restorative surgery with neoadjuvant therapy is the optimal strategy for most patients with locally advanced rectal cancer, in terms of oncologic outcomes. Unfortunately, both surgery and radiotherapy impair bowel function and may incur lifelong disability. The rectal remnant is considered to have a major impact on postoperative function, but doubts exist given the disturbance of neoadjuvant therapy. The present study aimed to investigate whether the risk of severe bowel dysfunction was associated with the length of irradiated remnant rectum.

Methods/Interventions: Patients who underwent sphincter-saving surgery preceded by chemoradiotherapy for rectal cancer between 2010 and 2017 were included. Postoperative bowel function was assessed using the low anterior resection syndrome (LARS) score at a minimum of one year following surgery. The length of remnant rectum was measured on postoperative MRI of the pelvis. Multivariate analysis was used to verify the effect of irradiated remnant rectum.

Results/Outcome(s): A total of 257 eligible patients were identified, and 241 (93.8%) patients responded after a median of 36.8 months from surgery. Full-dose radiotherapy was performed in 94.2% (227/241) of patients, and 44.4% (107/241) of patients had a lower-third tumor. Overall, bowel dysfunction was observed in 90.9% (219/241) of patients, with 72.6% (175/241) reporting major LARS. A larger remnant rectum was associated with a lower risk of having major LARS ($p \leq 0.001$, Fig.1). Regression analysis identified a short rectal remnant (length ≤ 20 mm)

independently associated with the risk of major LARS (OR = 3.53; $p = 0.001$).

Conclusions/Discussion: Bowel dysfunction is an extremely frequent long-term disability after restorative surgery combined with neoadjuvant chemoradiotherapy for rectal cancer. Functional benefit remains from an irradiated remnant rectum. Certain preservation of the distal rectum is the bottom line to have a better functional outcome for patients treated with neoadjuvant therapy.

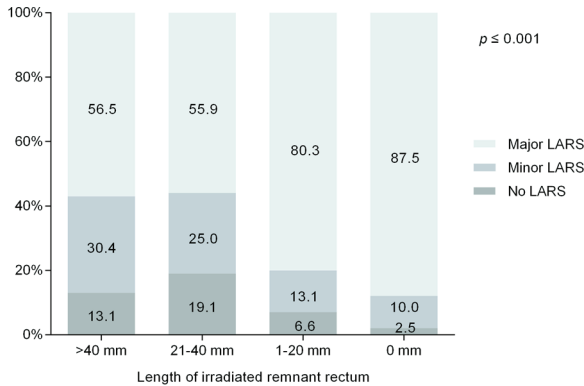


Figure 1. LARS score category according to length of irradiated remnant rectum

READY FOR THE NATIONAL ACCREDITATION OF PROGRAMS FOR RECTAL CANCER? AN AUDIT OF RECTAL CANCER OUTCOMES IN THE UNITED STATES FROM THE NATIONAL CANCER DATABASE.

P569

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Purpose/Background: With development of the National Accreditation of Programs for Rectal Cancer (NAPRC), rectal cancer standards were published to measure and improve performance. These standards aim to educate on precision surgery, multidisciplinary care, and improve clinical outcomes and technical quality measures. Studies have been performed at the institutional level, to assess outcomes before and after implementation of these standards. No study has evaluated the national state at baseline. As the NAPRC is implemented, the readiness of the country to meet these standards is unknown. Our goal was to evaluate the current state of compliance with process and outcome measures in rectal cancer compared to NAPRC standards.

Methods/Interventions: Review of the National Cancer Database registry was performed from 2010-2015 for all resections for rectal adenocarcinoma performed via an abdominal approach at participating hospitals. Local excisions and endoscopic approaches were excluded. The demographic, staging, operative, and oncologic data were

evaluated. The main outcome measures were the technical, process, and quality measures compared to the published NAPRC standards.

Results/Outcome(s): During the study period, 73,363 cases met inclusion criteria and were evaluated. The majority were male (60.7%) that received neoadjuvant chemoradiation (55.6%). From the clinical staging, 40.6% were T3 lesions and 42.2% node positive. Most patients lived within 0-20 miles of their treatment center (66.1%). The most common procedure category was Low Anterior/ Anterior Resection/ Hartmann’s (64.3%), and 60.9% of all procedures were performed open. Pathologically, the majority had no residual tumor (90.1%), a negative Circumferential Resection Margin (CRM, 84.3% >1 mm), an adequate lymph node harvest (67.7% >12 nodes), and minimal response to neoadjuvant therapy (Pathologic Tumor Regression Grade 2, 73.2%). The data showed a failure to meet targets for staging performed prior to definitive treatment (78.7%), CEA level obtained prior to definitive treatment (63%), and involved CRM rate (12.5%). Important reporting issues were identified that limited a proper audit, including having the restorative low anterior resection grouped with a non-restorative procedure, failing to offer fields for distal and proximal margins, completeness of total mesorectal excision, surgeon specialty, and recurrence rates.

Conclusions/Discussion: There are limitations in the data reporting that limit a proper national audit for rectal cancer surgery. From the available elements and limits, the United States as a whole is not ready for the NAPRC. The critical need for a national registry and the individual institutions role in assessing their metrics is highlighted for continuous quality improvement within the NAPRC framework.

NAPRC Scorecard- Rectal Cancer Audit (n=73,363)	National Value 2010-2015	Goal
Process Measure		
Diagnosis confirmed by biopsy prior to treatment	99.8%	100%
Staging performed prior to definitive treatment	78.7%	95%
CEA level obtained prior to definitive treatment	63%	100%
Quality Measure		
Involved Circumferential Resection Margin rate	12.5%	5%
Involved distal resection margin rate	Not reported	0%
Mesorectal grade rate	Not reported	100%
Local recurrence rate	Not reported	3%

COLON CONSERVATION TECHNIQUES FOR UNRESECTABLE COLON POLYPS IN 100 PATIENTS: A SINGLE INSTITUTION'S ALGORITHMIC APPROACH.

P570

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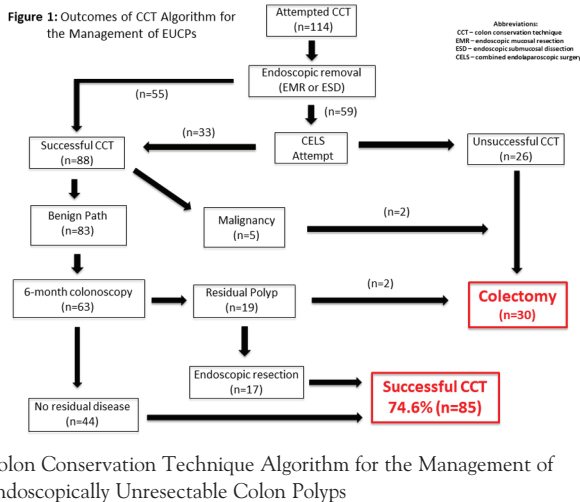
Purpose/Background: Approximately 10-15% of polyps are 'complex' and unsuitable for endoscopic removal during screening colonoscopy. The standard of care for endoscopically unresectable colon polyps (EUCP) is laparoscopic segmental colectomy (LSC). Approximately 30,000 segmental colectomies are performed annually in the United States for benign colon polyps. According to the ACS risk calculator, the average risk of any complication for an elective LSC is 10%. Advances in colon conservation techniques (CCT) have been employed to resect polyps while avoiding a colon resection. These include endoscopic mucosal resection (EMR), endoscopic submucosal dissection (ESD) and combined-endolaparoscopic surgery (CELS). This study presents initial outcomes of 108 patients who were referred to general surgery for EUCP who underwent an attempted CCT.

Methods/Interventions: An institution-wide, prospective approach to EUCP was implemented at Kaiser Permanente San Diego (KPSD) from 2012-2018. Colonic polyps that were deemed unresectable by KPSD gastroenterologists were referred to one of two colorectal surgeons who offered CCT after a thorough informed consent discussion. Indications for referral included difficult location (ileocecal valve, appendiceal orifice), residual disease despite at least 2 polypectomy attempts, and early malignant polyps (high grade dysplasia, Haggitt's level 1-3, sm1). After IRB approval, charts for these patients were retrospectively reviewed for patient demographics, procedures, complications and long-term outcomes. Statistical analysis was performed using the mean for averages and a two tailed Students T test.

Results/Outcome(s): 108 patients underwent attempted CCT for 114 EUCP at KPSD. The average patient age was 66 years, 53% (n=57) were male and 46 patients (43%) had ASA scores of 3 or 4. The most common indications for referral was a sessile polyp (53%, n=54), pedunculated polyp or location behind a fold (11%, n=11), and concern for malignancy (10%, n=10). The most common polyp location was the right colon, with 22% (n=25) in the ascending colon and 32% (n=36) in the cecum. 88 patients (77%) had successful EUCP removal via CCT while 25 required LSC and 1 patient required an open colectomy (23%). Within the entire CCT group, 48% were successfully completed endoscopically (23 by EMR and 32 by ESD) and an additional 33 were resected via CELS (29%). 14 CCT attempts were converted to LSC due to surgeon concern for malignancy

(12.3%), 7 for EUCP involving the ileocecal valve (6.1%), and 5 for technical issues preventing safe CCT (4.4%). The average procedural times in minutes for EMR, ESD, CELS and LSC were 70, 102, 157 and 212, respectively and the average length of hospital stay in days were 0.26, 0.52, 0.78 and 4.67, respectively. The total group had an average procedural time of 137 minutes and length of stay of 1.4 days. Compared to LSC, all CCT procedures had a significantly shorter length of hospital stay ($p < 0.01$). The overall complication rate for all procedures was 17.5%, with lower gastrointestinal bleeding (LGIB) and delayed perforation being the most common complications at 6.1% (n=7) and 2.6% (n=3). Of the LGIBs, 5 patients underwent EMR and 2 underwent ESD, 3 were managed with observation, 2 underwent repeat colonoscopy without intervention and 1 had an endoscopic clip placed. There were 3 delayed perforations, 1 after EMR and 2 after ESD. Of these 3 perforations, 2 patients were returned to the operating room while 1 was successfully managed non-operatively. There were 2 deaths in the entire study, both of which in the LSC group. Both mortalities were related to prolonged hospital courses, with one ultimately developing renal failure and the other bacteremia as a result of aspiration pneumonia. 83 patients (94%) who underwent successful CCT had a benign final pathologic outcome while 5.7% (n=5) demonstrated a malignancy, of which only 2 patients required formal LSC. In the entire cohort, 17 EUCP demonstrated a malignancy on final pathology, of which 2 were sm1 lesions treated with CCT. 63 of 83 patients in the benign CCT group have had a 6-month surveillance colonoscopy (76%). Within this group, 30.6% (n=19) had a residual polyp, but 17 were successfully treated endoscopically. Only 2 of 63 surveilled patients have required LSC because of residual EUCP (3.2%). The overall success rate for CCT in the management of EUCP in this study was 74.6% (n=85). See **Figure 1** for final outcomes.

Conclusions/Discussion: Colon conservation techniques such as EMR, ESD and CELS for the resection of EUCP are safe, cost-effective treatment options that produce comparable oncological outcomes to segmental colectomy. This experience demonstrates that the prospective adoption of a surgical management algorithm to EUCP can result in a significant reduction in LSC, hospital length of stay, and perioperative complications, without compromising oncologic outcomes.



COMPARISON OF THE SIZE OF SENTINEL VS NON-SENTINEL LYMPH NODES IN COLORECTAL CANCER AFTER LYMPHATIC MAPPING.

P571

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Purpose/Background: It has been hypothesized that conventional pathological examination finds fewer lymph nodes (LNs) and misses micrometases in about 15% of patients (Pts), compared to pts undergoing sentinel lymph node (SLN) mapping (M) with ultrastaging of the SLNs in colorectal cancer (CRCa). It is presumed that the SLNs may be smaller than the non-SLNs, and are missed by conventional pathological examination, hence the difference. Accordingly, we compared the sizes of the SLNs vs. non-SLNs in CRCa pts undergoing SLNM to further validate this hypothesis.

Methods/Interventions: The SLNM was performed by subserosal peritumoral injection with blue dye. The first 1-4 blue-stained LNs are tagged as SLNs and are sectioned by 5 levels, 4 stained with H&E, 1 with cytokeratin. The non-SLNs were sectioned at 1 level, stained with H&E. The greatest diameter of each node was measured on glass slides or by gross examination.

Results/Outcome(s): In 366 consecutive patients, there were 5,601 total LNs (15.3/Pt), 912 (16%) of which were SLNs and 4,689 (84%) were non-SLNs. Overall, 10% of the LNs were positive, of which 19% of the SLNs were positive vs. only 8% of the non-SLNs were positive for metastases. Of all the LNs, 77% were 10mm. For the negative LNs, 82% were 10mm. For the positive LNs, 37% were 10mm. Overall, the mean size of SLNs vs. non-SLNs were 5.7mm vs. 4.0mm. For positive LNs, mean size of SLN vs. non-SLN were 9.3 mm vs. 7.7mm; while for the negative

LNs, the mean size of the SLNs vs. non-SLNs were 4.8mm vs. 3.7 mm, with a p-value <0.001.

Conclusions/Discussion: Our study confirms that on average, SLNs are bigger than non-SLNs, whether positive or negative for metastases. This maybe due to unique immunologic or hyperplastic reactions of the SLNs due to in direct pathway from the malignant tumor. This also stresses that diligent efforts are needed by the pathologists, as 77% of all the LNs are <5mm in size.

STOMA-RELATED COMPLICATIONS WITH PERMANENT COLOSTOMY AFTER LAPAROSCOPIC ABDOMINOPERINEAL RESECTION (APR) FOR RECTAL TUMOR.

P572

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Purpose/Background: In open abdominoperineal resection (APR), an extraperitoneal colostomy is often performed, and is theoretically favorable for preventing postoperative parastomal hernia (PSH). However, the benefits of laparoscopic extraperitoneal end colostomy remain unclear. The aim of this study was to investigate stoma related complications after Lap-APR for malignant rectal tumor.

Methods/Interventions: A retrospective review of 61 patients who underwent Lap-APR for malignant rectal tumor in our department between January 2009 and December 2016 was performed. Data were collected on patient demographic characteristics. Postoperative complications (POCs) within 30 days of surgery were assessed according to the Clavien-Dindo classification. Parastomal hernia (PSH) was diagnosed with computed tomography as of 6 months after colostomy.

Results/Outcome(s): Stomas were constructed through the extraperitoneal route in 23 patients and the transperitoneal route in 38 patients. Patient characteristics were similar between the extraperitoneal route group (EPG) and the transperitoneal route group (TPG). Operative time and blood loss differed between the two groups. The rate of POCs of \geq Grade 2 within 30 days of surgery was higher in the EPG. PSH was diagnosed in 1 patient in EPG and 9 patients in TPG ($p=0.048$). However, the incidence of other stoma-related complications did not differ between the two groups.

Conclusions/Discussion: Lap-APR doesn't cause midline incisional hernia and makes stoma care easier, compared with conventional open surgery. At an early phase after surgery, there were no differences in stoma-related complications between the two groups. At a late phase after surgery, the stoma creation through the extraperitoneal route may reduce the occurrence of the parastomal hernia.

BOWEL FUNCTION AFTER ULTRALOW ANTERIOR RESECTION WITH OR WITHOUT INTERSPHINCTERIC RESECTION (ULAR±ISR) FOR LOW LYING RECTAL CANCER: COMPARATIVE CROSS SECTIONAL STUDY FROM A TERTIARY REFERRAL CANCER CENTER.

P573

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Purpose/Background: Recently, sphincter preserving surgery (SPS) for treatment of low rectal cancer has been dramatically increased resulted from wide adoption of concurrent neoadjuvant chemoradiation. In spite of acceptable oncologic outcomes of SPS, many patients experience bowel dysfunction, not only in the form of low anterior resection syndrome (LARS) but also, variant degrees of fecal incontinence. Our study aimed to compare the functional bowel outcomes between ULAR and ISR for low rectal cancer.

Methods/Interventions: We identified consecutive 89 patients who underwent ULAR± ISR for low lying rectal cancer (located within 5cm from the anal verge) between December 2010 and May 2018, in Severance hospital. Wexner incontinence score and Memorial Sloan Kettering Cancer Center Bowel Function Instrument (MSKCC BFI) were used to evaluate the bowel function. MSKCC BFI questionnaire composes of 18 questions and is calculated by summation of all scores. The highest score is 90 which means better function, but Wexner highest score is 20 which means poor function. After restoration of bowel continuity, bowel function using questionnaire was asked to patients by a specialized nurse at the outpatient clinic from November 2015 till October 2018. Patients were categorized into 2 groups: ULAR and ULAR with ISR. Functional scores were compared in both groups. Statistical analysis was done by SPSS (version 23). Functional scores were shown as means and standard deviations. Comparison of variables using chi square, t test. For risk factor analysis, we used logistic regression. P value was considered significant if < 0.05

Results/Outcome(s): Our study comprised 89 patients, ULAR(1st) group included 63 patients with mean age of 60.1 ± 11.5 years, while ISR(2nd) group included 26 patients in whom the mean age was 58.6 ± 10.7 years. Mean distance of tumor from anal verge (AV) varied significantly in both groups (3.9 ± 0.9 vs 2.9 ± 0.8 cm $P < 0.001$). Ninety-two (92.3%) of the 2nd group and 76.2% of the 1st group received preoperative neoadjuvant chemo radiation ($P = 0.136$). Both stapled and hand sewn anastomosis were used in 1st group, while the 2nd group hand sewn anastomosis was the only used ($P = 0.029$). All patients had covering loop ileostomy except one patient in 1st group. The mean ileostomy closure time interval

was not statistically different in both groups (5.3 ± 2.4 vs 5.4 ± 2.1 months $P = 0.760$). The mean follow up time after ileostomy closure was after 15.4 ± 20.6 months in 1st group and 10.8 ± 16.5 months in the 2nd group ($P = 0.315$). The mean number of bowel movement/day in 1st group was 10.1 ± 7.3 while in the 2nd group was 11.5 ± 9.1 ($P = 0.452$). The mean MSKCC score in both group was 66.5 ± 9.7 and 65.9 ± 10.2 respectively (P value = 0.798). While the mean Wexner score was higher in 2nd group than 1st group but did not reach statistical significance (group 1: 12.5 ± 6.5 vs. group 2: 9.8 ± 6.1 ; $P = 0.074$)., Based on the result of mean Wexner and MSKCC score (10.6 and 66.2, respectively) in whole patients, we defined minor incontinence as Wexner score < 11 and MSKCC > 66 . While major incontinence as Wexner score ≥ 11 and MSKCC ≤ 66 . After that group 2 showed frequent major incontinence in Wexner score, compared with group 1 (76.9% vs. 50.7%; $P = 0.032$). By passage of time and specially after 1 year from ileostomy closure, bowel function became better. Only 22 patients (34.9%) of 1st and 6 (23.1%) of 2nd group, were noticed to have significantly improved mean number of bowel movement/day (7.1 ± 7.1) ($P = 0.004$) and Wexner score (8.6 ± 6.9) ($P = 0.040$) after one year follow up. Meanwhile no significant difference in MSKCC score ($P = 0.924$). In multivariate analysis, ISR significantly increases the risk of major incontinence together with distance of tumor from AV, follow up time interval before one year and estimated blood loss (EBL) > 500 ml.

Conclusions/Discussion: Sever bowel dysfunctions and major incontinence were noted in patients with ISR during follow up periods after ileostomy take down. Therefore careful selection and discussion with the patients before surgery as regard bowel dysfunction is mandatory after exclusion of any associated risk factors. This study has some limitations including; being retrospective, and the follow up time period of most of patients is different mainly before 1st year, so that is why our results show high percentage of poor function.

TOTALLY ROBOTIC EXCISION OF GANGLIONEUROMA ABUTTING LT. RENAL VESSELS: CASE REPORT.

P574

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Purpose/Background: Ganglioneuroma is a rare and benign neoplasm arising from the autonomic nerve fibers. Ganglioneuroma most frequently occur in the abdomen, but it can be found at any site containing sympathetic ganglion cells, including mediastinal and cervical region. It is slow growing tumor and typically asymptomatic. Because of its location and closing to major vessels, minimally invasive surgery is challenging. We report a patient with ganglioneuroma abutting Lt. renal vessels

performing totally robotic excision of the retroperitoneal mass, successfully.

Methods/Interventions: A 37-years-old female visited to our hospital for evaluation of the abdominal mass found incidentally on medical examination. The imaging study including abdomen CT and abdomen MRI showed about 3cm sized poorly enhancing solid mass in left paraaortic area, below the Lt. adrenal gland. Evaluation revealed non-functioning retroperitoneal tumor. We suspected a benign tumor including neurogenic tumor and recommended the patient to perform the surgical excision for pathological confirmation. The surgery was performed with patient on lateral position using transperitoneal approach. Using da Vinci Xi Surgical System(Intuitive Surgical Inc., Sunnyvale, CA, USA), four port technique(8mm robotic port x 4) and one 12mm assistant port was utilized. The tumor was located between Lt. renal vein and artery, especially Lt. adrenal vein overlying the mass(Fig 1.). With preserving Lt. adrenal vessels, the tumor was excised completely without major vessel injury. After hemostasis was performed, one closed drain was inserted to Lt. subphrenic space.

Results/Outcome(s): The patient had good recovery without serious complication and discharged on postoperative six days after removing of drain. Histopathologic diagnosis was ganglioneuroma (3.5 x 2.2 x 1.6 cm).

Conclusions/Discussion: In retroperitoneal tumor abutting major vessel, totally robotic excision of retroperitoneal mass was feasible without injury of vessels.

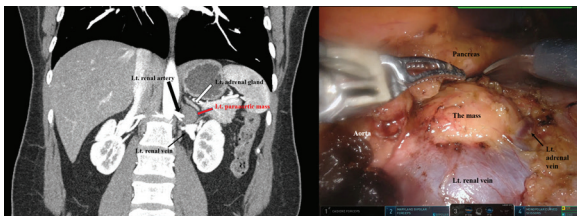


Figure 1. Abdomen CT and operation capture view. The mass was located between Lt. renal artery and vein. Lt. adrenal vein was arisen from Lt. renal vein and passed over the mass.

A PROSPECTIVE STUDY TO EVALUATE VIDEO-ASSISTED ANAL FISTULA TREATMENT (VAAFT) COMBINED WITH ADVANCEMENT FLAP FOR TREATMENT OF COMPLEX ANAL FISTULA.

P575

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Purpose/Background: Surgical treatment of the complex anal fistulas remains challenging. The operation chosen must balance the choice between the healing rate and the quality of life. It was the goal of clinicians that is reducing the recurrence rate, curing the disease and reduce the damage of the anal function. Aims of this prospective study were to evaluate the safety and efficacy of video-assisted anal fistula treatment (VAAFT) combined with advancement flap for the complex anal fistula.

Methods/Interventions: A retrospective study based on a prospectively collected database was performed between October 2015 to October 2018. Patients undergoing video-assisted anal fistula treatment (VAAFT) combined with advancement flap at Longhua Hospital were identified. All patients were evaluated by clinical and physical examination, anorectal manometry, endoanal ultrasound and perianal MRI at the baseline. Follow-up visits were scheduled at 1, 3,6 and 12 months after the operation.

Results/Outcome(s): From October 2015 to October 2018., 55 patients(46 males, 9 females mean age 40) were enrolled, and the VAAFT combined with advancement flap was used in all patients. All cases were complex anal fistula: high transphincteric in 36 patients, extrasphincteric in 2 patients, suprasphincteric(Horseshoe extension) in 7 patient. The average operative time was 84 minutes. The mean follow up was 15.4 months (range, 7-24.5). Healing rate of 94% confirmed by clinical evaluation, without anal incontinence (evaluated by Wexner Score for Incontinence). 3 patients required further surgical treatment. No patient experienced any change of continence. However, we found that postoperative anal resting pressure decreased (51mmhg to 39mmhg) during the first three months of follow-up.

P573 Multivariate analysis of risk factors of major incontinence based on Wexner score.

Risk factors	OR(95%CI)	P value
Age>60 years	0.976(0.395-2.408)	0.958
Preoperative chemoradiotherapy	1.766(0.609-5.121)	0.295
Anastomosis method(stapled vs handsewn)	1.279(0.343-4.770)	0.714
AV distance	0.544(0.331-0.894)	0.016
Surgery type(ISR)	0.309(0.106-0.905)	0.032
Follow up time interval <1 year	0.328(0.123-0.874)	0.026
Ileostomy closure after >2months	0.262(0.063-1.093)	0.066
EBL> 500ml	0.262(0.063-1.093)	0.038

OR: Odds ratio, CI: confidence interval, EBL: estimated blood loss, AV: Anal verge, ISR: Intersphincteric resection

Conclusions/Discussion: VAAFT (Video Assisted Anal Fistula Treatment) and Advancement Flaps is safe and feasible for treating Complex Anal Fistula. with a low recurrence rate. The anal function is protect better than another procedures. However, a longer FU and larger population study are needed to confirm these results.

DIFFICULTIES DIFFERENTIATING DISPARITIES IN DIVERTICULITIS: STATE-WIDE EVALUATION USING THE NORTH CAROLINA STATE INPATIENT DATABASE.

P576

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Purpose/Background: Diverticulitis is a commonly occurring benign disease process affecting upwards of 50% of Americans at some point in their lifetime. While only 1% of sufferers will undergo a surgical procedure for complications of diverticulitis, 30 million individuals will be burdened by pain, need for treatment, and anxiety related to high costs of care. Prior studies indicate disparities in outcomes of diverticulitis treatment based upon race, insurance status, and socioeconomic factors, while others suggest disparate care is more closely related to environment. As such, conflicting data provide an unclear path forward for reduction of these observed disparities. This study seeks to further evaluate possible care disparities across multiple years in a state-specific inpatient database.

Methods/Interventions: The state inpatient database (SID) for North Carolina was obtained from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) for years 2005-2010. These years were chosen due to presence of a patient-specific readmission variable, which was subsequently removed after 2011. After consolidation of datasets a query identified any patient with primary diagnosis (DX1) of diverticulitis of colon (without mention of hemorrhage) (ICD9 562.11). Patients with missing RACE and readmission (VISITLINK) data were excluded from analysis. Patients were grouped into those with single (group 1) and multiple (group 2) admissions throughout the study period. Here, patients with a single admission were divided into "non-operative" and "operative" cohorts based on pre-determined procedure codes related to treatment of diverticulitis. Comparisons were then completed utilizing univariate analysis, specifically t-tests and Wilcoxon-Mann-Whitney tests for continuous variables and Chi-square or Fisher's exact tests with categorical variables. $P < 0.05$ was considered statistically significant.

Results/Outcome(s): During the study period, 8932 total patients were identified with mean age 60.4 ± 15.4 years, 57.2% female and 82.8% Caucasian. Treatment in an urban center occurred in 65.7% of patients, with 86.4%

having either private insurance or Medicare, while 4.3% had Medicaid. The majority (62.8%) of patients were admitted via the emergency room with 71.5% undergoing CT scan at some point during hospitalization and 10.2% receiving ICU care. Overall mortality was 0.9%. From a cost standpoint, 39.2% of patients had total charges $< \$10k$ and 54.1% had total charges $\$10k-50k$. Length of stay (LOS) < 3 days was seen in 45% of patients, with 91.4% demonstrating < 10 day stay. Following creation of cohorts as noted above, we found most patients were managed non-operatively ($n=6078$, 68.1%). Non-operative patients were older (61.3 ± 16.2 vs 58.6 ± 13.6 years, < 0.0001), less frequently white (80.0 vs 88.9%, < 0.0001) and more frequently female (60.0 vs 51.5%, < 0.0001). Those treated in urban centers were less frequently non-operative (62.4 vs 72.7%, < 0.0001). Interestingly, lower rates of private insurance (42.6 vs 57.3%, < 0.0001) were seen in non-operative patients. Non-operative patients were electively admitted less frequently (5.7 vs 45%, < 0.0001) and had higher rates of CT scan utilization (84.9 vs 42.9%, < 0.0001). Lower rate of mortality (0.3 vs 2.3%, < 0.0001) was seen in patients managed non-operatively. As expected, non-operative patients had lower total charges (57.1 vs 0.4 charges $\$0-10k$, < 0.0001 ; 99.9 vs 78.7% $\$0-50k$, < 0.0001) and shorter length of stay.

Conclusions/Discussion: There exist disparities in the management of benign colorectal disease, especially diverticulitis. Why those disparities exist, how they contribute to differences in outcomes, and how to combat those disparities are difficult questions to answer. This study was the first aspect of a multi-pronged effort to differentiate disparities in management of diverticulitis, focusing on patients over a specific period who only had a single admission for diverticulitis managed either operatively or non-operatively. Subsequent studies will involve targeted evaluation of single versus multi-admission patients, along with study of colinear variables, to see how the interplay of race, hospital-type, payor mix, insurance coverage and other factors contribute to the apparent disparities seen in management of this disease process. Once that is completed we can move forward with studying how these apparent disparities in management affect outcomes.

CAUSE OF DEATH AND FACTORS AFFECTING 5-YEAR SURVIVAL IN 85+ AGE GROUP WHO UNDERGO COLECTOMY FOR COLON CANCER.

P577

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Purpose/Background: Colon cancer is associated with aging, and adults > 85 years are the fastest-growing segment of the population. These "oldest old" have a higher risk of perioperative morbidity and mortality, and these risks persist beyond the immediate perioperative period. The

aim of our study was to evaluate 5-year survival in patients aged 85 and older with stage I to III colon cancer who underwent colectomy to investigate patient and disease specific factors that affect mortality.

Methods/Interventions: The New York State Cancer Registry (NYSCR) and Statewide Planning & Research Cooperative System (SPARCS) were queried for patients 85 years and older who underwent colectomy for stage I to III colon cancer between 2004 and 2014. Comorbidities were obtained from inpatient and outpatient SPARCS claims with survival data available through 2017. To assess for the long-term effects of surgery on survival, those who died within 30 days of colectomy were excluded from the analysis. Bivariate and multivariate Cox proportional-hazards analyses of factors associated with 5-year overall survival controlling for age, gender, marital status, Elixhauser comorbidities, operative approach, laterality and chemotherapy were performed.

Results/Outcome(s): Of the 5,108 patients aged 85 and older who underwent colectomy for stage I to III colon cancer, 506 (9.9%) died within 30 days of surgery and were excluded from the analysis. The cohort had an overall 5-year survival rate of 39.3%. Of the 4,602 patients who underwent colectomy 1,972 (42.9%) had a non-elective procedure. Five-year mortality by cause of death analysis showed the three leading causes of death in the cohort to be cardiovascular disease (n=955, 34.2%), colon cancer (n=951, 34.1%) and other cancers (n=265, 9.5%). Factors independently associated with shorter 5-year survival included higher stage (hazard ratio (HR), confidence interval (CI): stage I: reference, stage II: HR=1.19 (1.08-1.33), p=0.0008; stage III: HR=1.91 (1.71-2.13), p<0.0001; 5-year survival rate by stage- I: 49.4%, II: 41.8%, III: 28.6%), presence of a post-operative complication (HR: 1.33 (1.22-1.45), p<0.0001, 5-year survival: 42.2% vs 30.1%), non-elective surgery (HR: 1.45 (1.33-1.57), p<0.0001, 5-year survival: 47% vs 29.2%), increased age (85-89 years reference, 90-94 years HR=1.37 (1.25-1.49), p<0.0001; ≥95 years HR=1.75 (1.47-2.08), p<0.0001), male gender (HR=1.20 (1.10-1.31), p<0.0001), and presence of congestive heart failure (HR=1.28 (1.16-1.41), p<0.0001), chronic lung disease (HR=1.22 (1.10-1.35), p=0.0001), diabetes mellitus (HR=1.19 (1.08-1.31), p=0.0005), renal failure (HR=1.42 (1.26-1.60), p<0.0001), weight loss (HR=1.22 (1.06-1.40), p=0.0043), and cardiac arrhythmias (HR=1.24 (1.14-1.35), p<0.0001).

Conclusions/Discussion: Nearly 40 percent of patients age 85 and older undergoing colectomy for colon cancer survived to 5 years. Cardiovascular disease was the leading cause of death in this cohort, emphasizing the importance of geriatric assessment and preoperative optimization when possible. A concerning finding from our analysis is that 42.9% of patients had a non-elective resection which in and of itself is associated with higher morbidity and mortality. Further research is needed to identify modifiable

factors that can help reduce the burden of emergent procedures in this population.

Table: 5-Year Mortality and Cause of Death by Stage

Cause of Death	All Stages	Stage I	Stage II	Stage III
Cardiovascular Disease	955 (34.2)	227 (42.5)	467 (38.5)	261 (25.0)
Colon Cancer	951 (34.1)	92 (17.2)	338 (27.8)	521 (50.0)
Other Cancer	265 (9.5)	59 (11.0)	113 (9.3)	93 (8.9)
Respiratory Disease	183 (6.6)	49 (9.2)	91 (7.5)	43 (4.1)
Neuropsychiatric Disease	131 (4.7)	38 (7.1)	59 (4.8)	34 (3.3)
Infection	63 (2.3)	10 (1.9)	36 (3.0)	17 (1.6)
Renal Disease	48 (1.7)	17 (3.2)	17 (1.4)	14 (1.3)
Gastrointestinal Disease	48 (1.7)	12 (2.3)	23 (1.9)	13 (1.3)
Trauma	43 (1.5)	10 (1.9)	23 (1.9)	10 (1.0)
Diabetes Mellitus	30 (1.1)	6 (1.1)	13 (1.1)	11 (1.0)
Other Cause	74 (2.6)	14 (2.6)	34 (2.8)	26 (2.5)
Total	2,791	534	1,214	1,043

TRANSANAL HEMORRHOIDAL DEARTERIALIZATION SAFE AND EFFECTIVE FOR THE ANTICOAGULATED POPULATION: A SINGLE CENTER PROSPECTIVE STUDY.

P578

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Purpose/Background: With increasing prevalence of prescribed anticoagulation, clinically significant internal hemorrhoidal bleeding is a mounting dilemma for many surgeons. Invasive procedures often require cessation of anticoagulation or dose reduction, which may lead to unforeseen complications. We investigated the safety of transanal hemorrhoidal dearterialization (THD) in subjects receiving clinically indicated anticoagulation.

Methods/Interventions: Patients who underwent THD for symptomatic hemorrhoids refractory to medical treatment during a 31-month period were enrolled into a prospective database in a single hospital system. Subjects were categorized to those undergoing oral or intravenous anticoagulation (N=17) and those without exogenous or inherent coagulopathies (N=116). Postoperative bleeding, pain and recurrence served as primary and secondary endpoints over median follow-up of 6 weeks.

Results/Outcome(s): Between March of 2016 and October of 2018, 133 patients underwent THD for symptomatic internal hemorrhoids. The mean age was 54 +/- 14, 69% female and 94% with grade 3-4 hemorrhoids. The American Society of Anesthesiologist (ASA) physical status score above 3 was significantly higher in the anticoagulated patients (59% vs. 11%; p<0.001). Postoperative hemorrhage in anticoagulated patients was not statistically significant compared to the non-anticoagulated cohort (17.6% vs. 6.1%; p=0.243). Short-term follow-up at six weeks did not demonstrate a significant increase recurrent prolapse (0 vs. 2%) between the groups.

Conclusions/Discussion: In patients on anticoagulation, THD may provide a safe and effective surgical option in managing medically refractory internal hemorrhoidal disease in this population. Further studies with larger cohorts would be necessary to validate our preliminary data.

OUTCOMES OF SIMULTANEOUS LIVER RESECTION AND RIGHT COLECTOMY FOR METASTATIC RIGHT COLON CANCER IN THE US POPULATION.

P579

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Purpose/Background: Surgical resection of colon cancer with isolated liver metastases is a potentially curative treatment. The aim of this study was to determine the short-term perioperative and oncological results of simultaneous liver resection and right colectomy for right colon cancer using the national American College of Surgeons National Surgical Quality Improvement Program database (ACS-NSQIP).

Methods/Interventions: We reviewed the ACS-NSQIP targeted colectomy database from 2012-2016 to identify patients who underwent simultaneous liver resection and right colectomy for right colon cancer using current procedural terminology codes. Primary outcomes were margin status, number of lymph nodes harvested, anastomotic leak and 30-day mortality. Multivariate analysis was used to determine the association between extent of liver resection, anastomotic leak, and mortality.

Results/Outcome(s): A total of 468 patients underwent right colectomy with simultaneous liver resection (RCSLR) –397 underwent open RCSLR, 71 underwent laparoscopic/robotic RCSLR. Of these, 281 (60.0%) underwent wedge liver resection, 124 (26.5%) underwent partial lobectomy, 43 (9.2%) underwent ablation, and 20 (4.3%) underwent lobectomy. On average 21.20 ± 11.42 lymph nodes were harvested. There were 12 cases (2.6%) of positive margins, and 19 (4.1%) cases of anastomotic leak. The 30-day mortality was 17 (3.6%). On multivariate analysis after controlling for demographics, comorbidities, nutritional labs, and LFTS there was no association between extent of liver resection with either anastomotic leak or mortality.

Conclusions/Discussion: In our national study, the simultaneous right colectomy and liver resection was associated with acceptable oncological and perioperative

outcomes. There was no association between the extent of liver resection and mortality. In appropriately selected patients simultaneous major liver resection and right hemicolectomy is feasible and safe.

TRAVEL DISTANCE AND HEALTHCARE UTILIZATION AFTER COLORECTAL SURGERY.

P580

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Purpose/Background: Colorectal surgery (CRS) patients are prone to unplanned, high resource healthcare utilization (UHRHU), such as readmissions, emergency department (ED) visits, and observation stays. Often CRS patients travel long distances for surgical care, but the impact of this travel distance on rates and location of unplanned follow up care is unknown. We hypothesize that patients who travel over 60 miles for CRS will have higher rates of UHRHU and be more likely to seek care somewhere other than the index hospital.

Methods/Interventions: Adult CRS patients at a single-institution were enrolled in a prospective cohort study during a 12-month period in 2017-18. Participants were enrolled during their index surgical hospitalization. Dates of admission, surgery, and discharge, and potential risk factors such as basic demographics, surgical diagnosis, type of surgery, presence of an ostomy, presence of any in-hospital complications, and travel distance from home to the index hospital were abstracted from the medical record. Additionally, any follow up visits with the surgeon or UHRHU events (readmission, observation stay, or ED visit) occurring within 30 days of discharge were also abstracted. For UHRHU, the date, type, and location where they initially presented were recorded. Participants were then contacted 30-40 days after discharge to complete a brief telephone survey. Information on utilization of healthcare at the index surgical hospital and elsewhere was collected. Participants were considered to have a 30-day

P578 Outcomes of Patients Undergoing THD

	THD on Anticoagulation	THD Without Anticoagulation	p Value
ASA Score+	2.6	1.8	0.001
Hemorrhoidal Grade (mean)	3.2	3.1	NA
Operative Time (min)++	11.2	12.3	NA
Mucopexy (mean)	3.23	2.98	NA
Postoperative Morbidity			
---Bleeding (%)	17.6	6.1	0.243
---Pain (%)	5.9	26.1	0.009
---Recurrence (%)	0	2	NA

+ Paired t-test comparing low risk (ASA <3) and (ASA 3)

++ Average operative time in minutes

UHRHU event if they had an event identified through chart abstraction and/or they reported an event during the phone survey. If a participant was noted to have more than one event in a single day (i.e. ED visit and then readmitted), this was counted as a single event. We compared recalled events to those available in the electronic health record. Multivariable logistic regression was used to create the most parsimonious model, and adjusted odds ratios (aOR) were reported.

Results/Outcome(s): 127 participants were enrolled and 85 respondents have completed phone surveys (66.9% response rate). Fifty-four percent of participants were female. Race was reported as non-Hispanic white for 74%, black for 18%, Hispanic for 2.4%, and other/unknown for 5.6%. The mean age was 54.8 years (standard deviation +/- 15.7, range 20 to 82). Thirty-one percent of participants had a cancer-related surgical diagnosis. Thirty percent of participants had an ostomy created during initial surgery. Eighty-six percent of participants attended a routine follow-up visit with the surgeon. Gender and race were not associated with risk of UHRHU. Cancer patients tended to have lower odds of UHRHU, but this was not statistically significant (OR 0.73, 95% CI 0.35-1.56, $p=0.421$). Patients with an ostomy created during the index hospitalization were much more likely to have UHRHU (OR 3.55, 95% CI 1.71-7.39, $p<0.05$). Nearly one third (31%) of participants had a 30-day UHRHU event (27% at the index hospital, 4% elsewhere). Among UHRHU events which occurred or culminated at the index hospital, 73% were readmissions, 12% were observation stays, and 15% were ED visits. Of those readmitted/observed at the index hospital, 17% presented to an OSH initially, 40% presented to index hospital ED, and 43% were readmitted directly. Less than half (44%) of patients with UHRHU occurring at OSH were ever transferred to the index hospital. Participants who travelled > 60 miles were more likely to attend a routine follow-up clinic visit than patients who travelled <60 miles (80% vs 91%, aOR 3.36, $p<0.05$) but there was no statistically significant difference in their risk of UHRHU event overall (23% vs 32%, aOR 0.61, $p=0.109$) or in their risk of presenting initially at an outside facility (55% vs 44%, aOR 0.91, $p=0.373$).

Conclusions/Discussion: UHRHU is not limited to readmissions at the index hospital. Observation stays and ED visits are also common in the post-operative period after CRS and may occur at any hospital. Patients who travel >60 miles to their index surgical hospital are more likely to attend their routine follow up visit and do not appear to be at higher risk for 30-day UHRHU than those travelling shorter distances. However, these patients often seek care elsewhere, and further research is needed to explore how this fragmentation of care does or does not impact perioperative and long-term outcomes.

ANALYSIS OF THE EFFECT OF TRANSANAL SPECIMEN EXTRACTION -3D LAPAROSCOPIC SIMULTANEOUS RESECTION FOR ELDERLY PATIENT WITH LOW RECTAL CANCER AND LIVER METASTASIS.

P582

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Purpose/Background: To explore the feasibility of transanal specimen extraction -3D laparoscopic simultaneous resection for elderly patient with low rectal cancer and liver metastasis.

Methods/Interventions: The clinical data of 56 cases of elderly patients (≥ 80 y) with low rectal cancer and simultaneous liver metastasis operated in department of gastrointestinal surgery, affiliated Shanghai east hospital of Tongji university from 2015 March to 2017 March were retrospectively analyzed. Among the 56 cases, 43 cases underwent laparoscopy surgery without incision which described as TransRectal Extraction of specimen and Transanal Endorectal Eversion and Transection, 13 cases underwent open surgery. For liver metastases, resection were simultaneous performed. The operation time, amount of bleeding, hospitalization length after operation, pain score, interval to first flatus, interval to first oral intake, postoperative lymph node number, tumor resection margin length, postoperative complication rate and disease free progression rate were analyzed between the two groups.

Results/Outcome(s): There were no significant difference in operation time, postoperative lymph node number, tumor resection margin length, postoperative complication rate and disease free progression rate ($P > 0.05$). The bleeding in the non incision group was less than that in the open group ((38.3 ± 18.7) ml vs. (83.5 ± 16.4) ml), the difference was significant ($P < 0.01$). The average hospitalization length after operation were (8.3 ± 1.6) d and (10.2 ± 1.5) d respectively, the difference was significant ($P < 0.01$). The VAS score of the two group was (3.5 ± 1.2) and (7.9 ± 1.5) , the difference was significant ($P < 0.01$). The interval to first flatus in the two groups were (16.0 ± 6.0) h and (48.6 ± 7.6) h, the difference was significant ($P < 0.01$). The interval to first oral intake were (47.1 ± 6.1) h and (72.8 ± 8.5) h respectively, the difference was significant ($P < 0.01$).

Conclusions/Discussion: Transanal specimen extraction - laparoscopic simultaneous resection in low rectal cancer with liver metastasis is safe and feasible, and may reduce postoperative bleeding, shorten postoperative recovery time and relieve pain of patient.

PT1 POLYP CANCERS: A SINGLE CENTRE EXPERIENCE AND OUTCOMES.

P583

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Purpose/Background: The management of polyps found to contain invasive carcinoma can be challenging and must be tailored to the individual patient. The balance of risks when opting for less invasive endoscopic management must be weighed against the risk of residual lymph node metastasis and incomplete resection. Similarly, definitive resection carries with it all the risks of major bowel surgery for uncertain benefit. We discuss our experience of polyp cancers and outcomes.

Methods/Interventions: Patients who were treated for sigmoid or rectosigmoid cancer in the past five years (April 2013 to April 2018) in our hospital were identified using data stored on the national bowel cancer database (Somerset). Histology, endoscopic and operative records were reviewed to identify management and surgical outcomes.

Results/Outcome(s): Out of 227 patients treated for left colonic cancers, 18 were identified with polyp cancers following endoscopic polypectomy. Of these, 16 had sigmoid polyps and 2 had polyps in the rectosigmoid. One polyp had poorly differentiated adenocarcinoma and the others were well differentiated. five patients who underwent polypectomy had positive margins. All malignant polyps were staged with CT and MRI and tattooed endoscopically. All 6 patients with high risk polyps underwent staged segmental resection (anterior resection) following polypectomy and the remaining 12 were surveilled closely. No residual tumour or lymph node metastasis was identified during the final histological analysis. Median follow-up is 36 months and no patient has yet presented with recurrent disease.

Conclusions/Discussion: Endoscopic management is a safe and sufficient way to manage selected pT1 polyp cancers. Current consensus is to consider radical surgery in the presence of poorly differentiated histology, lymphovascular invasion or positive margins. Interestingly, in all our patients who underwent radical surgery, the final TNM staging was unchanged. More research is needed to better predict the need for radical surgery and to improve the accuracy of pathological prognostic models.

THE CLINICAL EFFECT OF LAPAROSCOPIC TRANS-RECTAL SPECIMEN EXTRACTION SURGERY FOR COLORECTAL CANCER.

P584

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Purpose/Background: Current techniques of laparoscopic rectectomy require an abdominal incision for extraction of the specimen. Although this incision is smaller than that for open operation incision, it may reduce the advantages of laparoscopic surgery. Nature orifice specimen extraction surgery (NOSES), has the advantages such as little trauma, quick recovery. NOSE surgery biggest characteristic is that the natural tract specimens and digestive tract reconstruction. This video is aim to introduce the NOSES operation in rectal cancer.

Methods/Interventions: From July 2015 to July 2018, we had completed 276 NOSES cases in Gastrointestinal Surgery department of Shanghai East hospital. Operating time, blood loss, Short-term recovery, and quality of life were studied. The surgical procedures for the NOSES were as follows: The intestine duct at 2–4 cm in distance away from the lower edge of the tumor was bared and ligated with the gauze strip, and the distal intestine wall was transversely resected with an ultrasonic knife at approximately 1 cm away from the distal ligation line of the distal end of the tumor. The anus was fully expanded to the size of 4 fingers, and a toothed Kock clamp was inserted through the anus to approximately 4–5 cm above the rectal stump. The specimen protective sleeve with a length of approximately 25 cm was inserted with the main trocar through the lower right abdomen, and a sterile channel was created by pulling the sleeve from the anus. After the staple anvil was inserted through the anus, the specimen was placed in the protective sleeve and pulled out altogether. The closed margin of the proximal intestinal stump was cut off and locally sterilized; the anvil was then inserted, and the intestinal wall was fixed to the central rod of the anvil in a ring-like structure by a snare

Results/Outcome(s): All the surgery were performed successfully. The median operating time was 136 min (IQR, 104–168 min), and the median intraoperative blood loss was 32 ml (IQR, 10–66 ml). The median length of the extracted specimen was 20 cm (IQR, 13–25 cm). None of the patients required a temporary diverting stoma, and no postoperative mortality occurred. The median hospital stay was 8 days (IQR, 6–10 days). The incidence of postoperative complications was low, 45 (45/276) cases.

Conclusions/Discussion: With the development of surgical techniques and equipment, the surgical treatment of colorectal cancer is gradually steering toward minimally invasive surgery, which is the current general trend in the field of surgery. Laparoscopic technology has become popular worldwide, and in some fields, it has even replaced open surgery as a routine treatment. On

the basis of laparoscopy, in NOSE, surgical specimens are extracted through the natural orifice and the intestinal tract is reconstructed using an innovative technique. It is another innovative minimally invasive technology in the field of colorectal surgery. Asian populations, whose BMI is generally lower, constitute the basis for the widespread application of NOSE in the future. Patient weight and tumor size are the key determinants of the success of the transrectal extraction of surgical specimens. NOSES for rectal cancer is divided into three main steps: 1. Resect the specimen. 2. Specimen extraction, the focus is no-touch and aseptic technique. 3. Make the digestive tract reconstruction. The specimen protective sleeve and intra-abdominal anvil placement were adopted to complete the intestinal reconstruction under laparoscopy. These innovative measures can effectively reduce the risk of intraoperative intra-abdominal infection during NOSE and prevent tumor metastasis. In conclusion, NOSES for colorectal cancer is feasible and has a good short-term outcome. We consider that NOSES will be the bridge from laparoscopic surgery to NOTES.

SHORT-TERM SAFETY OF T4A UPPER RECTAL AND SIGMOID CANCER TREATED BY LAPAROSCOPIC RADICAL RESECTION BY TWO DIFFERENT PROCEDURES: NATURAL ORIFICE SPECIMEN EXTRACTION SURGERY VERSUS CONVENTIONAL ASSISTED INCISION.

P585

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Purpose/Background: To evaluate the short-term security of T4a upper rectal and sigmoid cancer treated by laparoscopic radical resection in natural orifice specimen extraction surgery and conventional assisted incision procedure.

Methods/Interventions: Clinical and follow-up data of 50 cases with T4a rectal or sigmoid cancer undergoing laparoscopic radical resection from January 2016 to February 2018 were analyzed retrospectively, 25 cases in natural orifice specimen extraction surgery procedure as observation group, 25 cases in conventional assisted incision procedure as control group. Surgical safety, oncologic safety and short-term outcomes were compared between two groups. Postoperative overall survival was analyzed using a K-M curve.

Results/Outcome(s): There were no significant differences in gender, age, operative time, blood loss, tumor size, length of distal resection margin, number of harvested lymph nodes, postoperative complications, positive tumor cells finding in abdominal flushing fluid, rate of local recurrence and distant metastasis between the two groups (all $p > 0.05$); The time to the first anal exhaust after surgery and the length of hospital stay statistically significantly

differed among the two group, observation group has a better results ($P < 0.05$). The K-M survival curve showed no statistically significant difference in the postoperative overall survival rate between two groups

Conclusions/Discussion: NOSES can obtain the same oncologic and surgical safety for T4a upper rectal and sigmoid cancer, and has better postoperative recovery.

PREOPERATIVE NOMOGRAM FOR PREDICTING THE PROBABILITY OF TRANSRECTAL SPECIMEN EXTRACTION AFTER LAPAROSCOPIC RECTAL RESECTIONS.

P586

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Shanghai, China

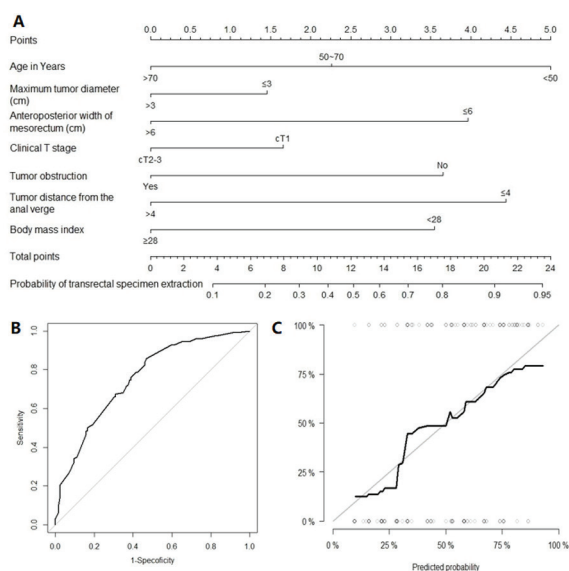
Purpose/Background: Natural orifice specimen extraction (NOSE) has been developed to reduce incision-related morbidity and postoperative pain in laparoscopic rectal cancer surgery. In laparoscopic rectal cancer surgeries, various NOSE techniques have been described, with transrectal specimen extraction being the most widely practiced. On the basis of previous studies, the limiting factors for transrectal specimen extraction might include a high body mass index, a bulky mesorectum and a massive tumor. Despite the encouraging early results, there were no data on which cases were appropriate for transrectal specimen extractions. The goal of this study was to develop a preoperative nomogram for predicting the probability of transrectal specimen extraction after laparoscopic rectal resections.

Methods/Interventions: The prediction nomogram model was developed in a cohort that consisted of 252 patients (126 patients with transrectal specimen extraction and 126 patients with transabdominal specimen extraction) who underwent laparoscopic surgery for rectal cancer, and data was gathered from January 2015 to March 2018. The clinical data collected included age, gender, BMI, clinical Union for International Cancer Control (UICC) TNM (tumor/node/metastasis) stage, tumor distance from the anal verge, tumor obstruction, history of abdominal surgery, maximum tumor diameter and width of mesorectum measured by MRI. Univariate analysis was used to test the association between surgical procedures and clinical factors. Cox proportional hazards regression was used for multivariable analysis and was represented by a nomogram. The performance of the nomogram was assessed with respect to its calibration and discrimination using bootstrap resampling.

Results/Outcome(s): Patients treated with transrectal specimen extraction were more likely to be younger, have a smaller tumor size, an earlier clinical T stage, a thinner mesorectum and a shorter tumor distance from the anal verge, and less likely to have tumor obstruction and a very high body mass index than patients treated

with transabdominal specimen extraction. Factors with the greatest influence on the probability of transrectal specimen extraction in the model included age, body mass index, tumor distance from the anal verge, tumor obstruction, clinical T stage, maximum tumor diameter and anteroposterior width of mesorectum measured by MRI. The nomogram showed an area under the receiver operating characteristic (ROC) curve (AUC) of 0.76 (95% CI, 0.70 to 0.81). The nomogram performed satisfactorily with a C-index of 0.76.

Conclusions/Discussion: We presented and validated a prediction nomogram in our study, which has the ability to generate an individual probability of transrectal specimen extraction after laparoscopic rectal resections by integrating preoperative clinical and radiologic variables that are easily available preoperatively. Surgeons could perform a preoperative individualized prediction of the probability of transrectal specimen extraction with this easy-to-use scoring system, which is in line with the current trend toward personalized medicine. Further prospective large-scale validation with external data is awaited.



Development and validation of a preoperative nomogram for predicting the probability of transrectal specimen extraction after laparoscopic rectal resections

(A) Nomogram. Locate the age of patient on the age axis. Draw a straight line up to the points axis to determine how many points toward transrectal specimen extraction the patient should receive. Repeat this process for each of the remaining axes, drawing a straight line each time to the points axis. Sum the points received from each variable and locate this number on the total points axis. Draw a straight line down from the total points to the probability of transrectal specimen extraction axis to ascertain the patient's specific probability of transrectal specimen extraction.

(B) Discrimination. Area under the receiver operating characteristic (ROC) curve (AUC) is 0.76 (95% CI, 0.70 to 0.81).

(C) Calibration. The nomogram predicts the probability of transrectal specimen extraction with a concordance index of 0.76.

DEEP NEURAL NETWORKS ASSISTED DIAGNOSIS FOR METASTATIC PELVIC LYMPH NODES.

P90

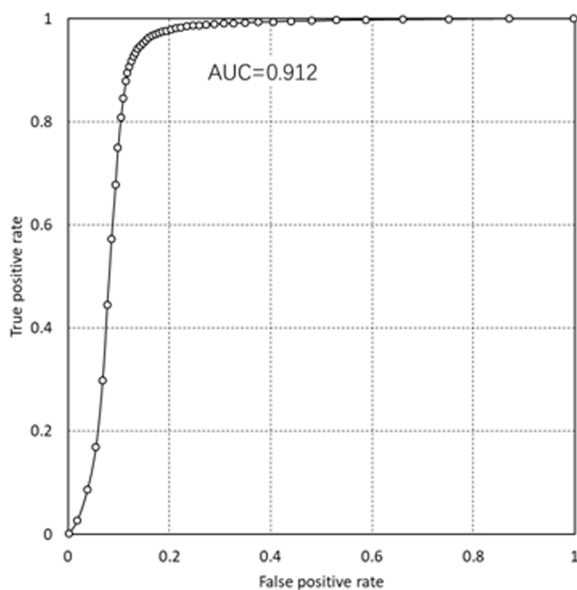
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Purpose/Background: The incidence rate of rectal cancer, especially in China, is rising. Pelvic magnetic resonance imaging has become the gold standard to determine lymph node metastasis. The traditional method is that imaging specialists read MRI to determine if a patient has lymph node metastasis by observing shape, boundary and signal intensity of lymph nodes. It is difficult to make a right and timely judgment in a short time, especially when they are faced with a large number of cases. The development of deep learning technology makes it possible to detect the target area in an image through image recognition technology. The deep learning algorithm developed by Stanford University is on a par with professional dermatologists in accurate recognition rate of skin cancer, but there is no report on MRI imaging related to rectal cancer. Imaging diagnosis of lymph node metastasis is more sophisticated than substantial lump diagnosis and directly affects the N staging. So we took the deep learning model FRCNN to realize lymph node metastasis. To train FRCNN, we collected MRI data of pelvic lymph nodes from several large-scale medical institutions in China and built a databas. This is the first time to propose that AI is better than general imaging specialists in the diagnosis and identification of Metastatic Pelvic lymph nodes in terms of both diagnostic quality and speed.

Methods/Interventions: MRI database of metastatic lymph nodes GE Signa 3.0T HDX MR scanner and multi-channel phased array coil were adopted for the establishment of MRI database, including preoperative pelvis MRI plain scan (351 cases) for patients with MRI pelvic lymph node metastasis from September 2011 to October 2017 in the Affiliated Hospital of Qingdao University, including 2 diffusion-weighted magnetic resonance imaging at horizontal position (32-48 images), T2 fat saturation scan at horizontal position (16-24 images), and 1 T1 imaging at horizontal position (16-24 images). Each case has 48-72 images, and in total 28,080 images on which senior imaging doctors have annotated locations of metastatic lymph node were provided for DNN. **Data analysis of metastatic lymph nodes in the database** Assessments from two senior imaging experts and 1 pelvic surgery specialist were chosen to annotate the lymph nodes which had minor axis equaling to and more than 5mm, unclear borders and irregular shapes on corresponding T2 FS images and showed high signal intensity on the DWI images, as metastatic lymph nodes. In the case that the diagnosis results from the three experts are inconsistent, the final conclusion was reached after discussion with the fourth imaging expert. A MRI image database was established with a total of 28,080 MRI images of metastatic pelvic lymph nodes.

Results/Outcome(s): Evaluation on training effect of the AI platform 28,080 MRI images of metastatic pelvic lymph nodes in the database was input into FRCNN, and 80,000 times of four-step iteration training were carried out to FRCNN. To evaluate the learning effect of FRCNN, 500 T2 FS images and 500 DWI images (a total of 1,000 MRI images of metastatic pelvic lymph nodes) were selected randomly as the test data and input in FRCNN which completed training. The recognition of FRCNN to the test data and the annotations in the database were compared to obtain the mean average precision (mAP) of FRCNN in the training process. mAP of FRCNN on the test data after 20,000 times of training reaches 100%, and there was no overfitting during 80,000 times of training. Therefore, FRCNN has been trained effectively for the MRI images of metastatic pelvic lymph nodes. **Clinical verification of AI's auxiliary function in the MRI imaging diagnosis of pelvic lymph node** 414 cases of rectal cancer patients from 6 Chinese medical centers were studied to validate AI platform's auxiliary effectiveness on MRI imaging diagnosis of pelvic lymph nodes. The rectal cancer cases in multiple medical centers contain 36,000 T2FS and DWI images of actual patients, and the final diagnosis was given by multiple imaging specialists from different centers after rigorous analysis and on the basis of final pathological diagnosis.

Conclusions/Discussion: Calculation result of the AUC is 0.912, this data shows that the diagnostic ability of AI in this research equals to that of imaging experts who have 20 years of diagnostic experience. AI assisted diagnosis is pretty effective. The automatic recognition time of an image for AI is 0.2 seconds, and the recognition time for patients who has 100 MRI images on average is 20 seconds, which has surpassed the level (10 minutes) of an imaging expert. Therefore, it can be concluded that imaging diagnosis aided by AI is more effective and efficient than traditional diagnostic methods, and has high feasibility and clinical value as well.



ROC of AI in diagnosing metastatic lymph nodes

ONE YEAR SURVEILLANCE AFTER HIGH-RISK ADENOMA IN A COLORECTAL CANCER SCREENING PROGRAM.

P587

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Purpose/Background: Background: After removal of a high-risk adenoma (HRA), there are still differences for the surveillance protocol between Western and Eastern countries. In 2012 we started a protocolized national colorectal cancer (CRC) screening program where we defined a one-year surveillance colonoscopy after removal HRA. Aim: To identify risk factors to develop HRA after a high quality screening colonoscopy

Methods/Interventions: Cohort study, from prospective, multicentric colorectal cancer screening program in Chile (PRENEC), from 2012 to 2018. Inclusion criteria: Patients with high quality screening colonoscopy (8 or 9 points in Boston's scale, reach to the cecum, retrieval time more than 8 minutes) who underwent a complete endoscopic resection for HRA. HRA: Serrated adenoma histology, high-grade dysplasia, polyps bigger than 1 centimeter or more than 3 adenomatous polyps. According to the protocol all patients with HRA had a follow-up colonoscopy after one year. We analyze clinic and anatomopathologic factors to develop a HRA in surveillance colonoscopy. Statistical analysis: chi-square test. p values less than 0.05 were considered statistically significant.

Results/Outcome(s): We performed 3,404 high quality screening colonoscopies. In this group, the initial findings were: 1,532 (45%) cases without polyps, 778 (23%) cases with low risk adenomas, 943 (28%) with HRA and 73 (2%) with cancer. Of the 943 patients with HRA, 321 (34%) had a high quality surveillance colonoscopy according to the protocol. A new HRA was identified in 89 (28%) patients. The risk factors associated with a new HRA were: smoker vs non smoker (58% vs 13%; p=0.0001), BMI>30 vs <30 (34% vs 22%; p=0.0243), women vs men (32% vs 20%; p=0.0242). Older age was not significant (50-59 years vs 60-75 years; 11% vs 20%; p=0.0556).

Conclusions/Discussion: Almost one third of the patients developed a new HRA after presenting a HRA in initial colonoscopy. Factors associated with the development of a new HRA were smoking, obesity and gender.

MULTICENTER PRELIMINARY RESULTS OF NEOADJUVANT CHEMOTHERAPY PRIOR ELECTIVE SURGERY FOLLOWING SELF-EXPANDING METALLIC STENTS FOR OBSTRUCTING LEFT-SIDED COLONIC CANCER.

P588

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Purpose/Background: To evaluate the safety and feasibility of neoadjuvant chemotherapy prior elective surgery following self-expanding metallic stents (SEMS) for complete obstructing left-sided colonic cancer.

Methods/Interventions: A total of 62 consecutive patients with obstructing left-sided colonic cancer who underwent elective surgery or neoadjuvant chemotherapy prior elective surgery following SEMS in five general hospitals from December 2015 to December 2017 were prospectively assessed. There were 41 patients with elective surgery and 21 patients with neoadjuvant chemotherapy prior elective surgery included in this study. The clinical data, operative results and postoperative complications of two groups were compared.

Results/Outcome(s): The study includes 38 males and 24 females with mean age of 64.8±8.8 yrs. The clinical baseline data between the 2 groups were not significantly different except that the average time interval between SEMS and surgery was significant longer in neoadjuvant chemotherapy group than in elective surgery group (61.6±13.5d vs 10.4±5.2d, $t=16.679$, $P=0.000$). There was no stent migration in two groups. Three patients had perforation in elective surgery group, one patient with perforation and one patient with obstruction in neoadjuvant chemotherapy group, and all these patients received emergent surgery. Adverse reactions of neoadjuvant chemotherapy were mainly degree 1 and 2 except one patient with degree 3 diarrhea. Patients in neoadjuvant chemotherapy group had significantly lower rate of stoma (4.8% vs 34.1%, $\chi^2=6.538$, $P=0.011$), higher rate of laparoscopic surgery (71.4% vs 36.6%, $\chi^2=6.751$, $P=0.009$), shorter operative time (147min vs 178min, $t=-3.255$, $P=0.002$), less intraoperative blood loss (47ml vs 127ml, $t=-4.129$, $P<0.001$), lower degree of surgical difficulty (3.3 vs 5.6, $t=-5.091$, $P<0.001$), shorter postoperative anus exhausting time (56.2h vs 69.0h, $t=-2.891$, $P=0.006$), and shorter postoperative hospital stay (8.5d vs 13.5d, $t=-2.246$, $P=0.028$) compared with patients in elective surgery group. While the surgical site infection rate and anastomotic leakage rate did not differ significantly between the two groups ($P>0.05$).

Conclusions/Discussion: Neoadjuvant chemotherapy prior elective surgery following SEMS might be a relatively safe and feasible approach for obstructing left-sided colonic cancer, and is associated with less stoma, more

laparoscopic surgery, shorter operative time, less blood loss, lower surgical difficulty, and faster postoperative recovery compared with conventional elective surgery.

PERINEAL WOUND COMPLICATIONS FOLLOWING EXTRALEVATOR ABDOMINOPERINEAL EXCISION FOR LOCALLY ADVANCED LOW RECTAL CANCER.

P589

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Purpose/Background: After the completion of extralevator abdominoperineal excision, reconstruction of the large pelvic defect poses a difficult challenge for the surgeons. The purpose of this study was to evaluate the effect of biological mesh for pelvic floor reconstruction after extralevator abdominoperineal excision.

Methods/Interventions: This was a nonrandomized, retrospective study. The study was conducted at a tertiary referral university hospital. Patients with low rectal cancer treated with extralevator abdominoperineal excision from August 2008 to December 2016 ($n=228$) were included. All patients received extralevator abdominoperineal excision operation. The main end points of this study were perineal wound complications after the operation.

Results/Outcome(s): Of the 228 patients who underwent extralevator abdominoperineal excision, 174 received biological mesh repair and 54 received primary closure. Preoperative radiotherapy was administered to 89 (51.1%) patients in the biological mesh group and 20 (37.0%) patients in primary closure group. The rates of perineal wound infection (11.5% vs. 22.2%; $p=0.047$), perineal hernia (3.4% vs. 13.0%; $p=0.022$), wound dehiscence (0.6% vs. 5.6%; $p=0.042$), and total perineal wound complications (14.9% vs. 35.2%; $p=0.001$) were significantly lower in the biological mesh group than in the primary closure group. Multivariable logistic regression analysis showed preoperative radiotherapy ($p<0.001$), conventional primary closure ($p<0.001$), and intraoperative bowel perforation ($p=0.001$) to be significantly associated with perineal procedure-related complications.

Conclusions/Discussion: Although perineal wound repair with biological mesh prolongs the time taken for the perineal portion of the operation, the perineal drainage retention time, and the length of hospital stay, it may reduce perineal-procedure related complications and improve wound healing. Preoperative radiotherapy and intraoperative bowel perforation appear to be independent predictors of perineal complications.

ANATOMICAL CHARACTERISTICS AND CLASSIFICATIONS OF HENLE'S TRUNK IN LAPAROSCOPIC RIGHT HEMICOLECTOMY - A NATIONWIDE MULTICENTER CLINICAL TRIAL IN CHINA.

P1

Z. He, B. Feng
Shanghai, China

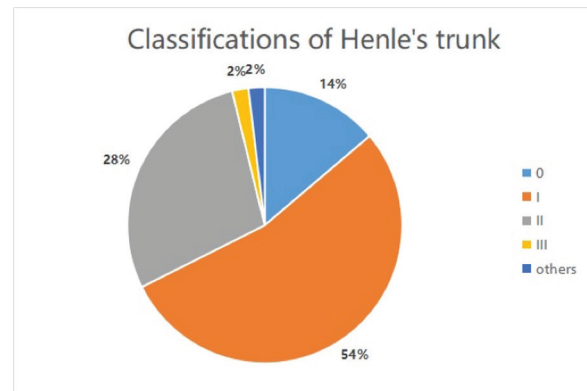
Purpose/Background: Henle's trunk (HT) is a convergence of veins lies in transverse retro-colic space (TRCS). The recognition and accurate dissection of HT is the key to reduce intraoperative blood loss and postoperative complication in laparoscopic right hemi-colectomy. Though the complexity and importance of HT was acknowledged, studies on direct intraoperative observation of HT were still lacking.

Methods/Interventions: Two hundred and ten patients from 16 hospitals in China who underwent laparoscopic right hemi-colectomy were included. The HT was intraoperatively observed and measured by qualified surgical teams. All the HT were categorized into 4 types, and the average length of HT was calculated. All the pictures of HT and clinical data of patients were collected for further analysis.

Results/Outcome(s): The Helen's trunk was observed intraoperatively in all 210 patients. The anatomical variations of HT were classified into four types based on the numbers of colic tributaries of the HT. Type-0 was defined as a type with no colic tributary (Figure 1). In type-I,

only one colic drainage vein joined to HT (Figure 2). Type-II possess two colic veins (Figure 3), and there are three colic veins join the trunk in Type III (Figure 4). The frequencies of Type-0, Type-I, Type-II, Type-III and others were 14% (n=29), 54% (n=113), 28% (n=60), 2% (n=4) and 2% (n=4), respectively (Figure 5). Among all the tributary situations, RCV+RGEV+ASPDV was most frequently seen (47.6%, n=100), followed by RCV+sRCV+RGEV+ASPDV (16.7%, n=35). The average length of Henle's truck was 9mm, which was shorter than those reported from western countries.

Conclusions/Discussion: This study may provide precise information about the type of confluent colic drainage veins to the HT. This may be helpful for understanding of the surgical vascular anatomy and the surgical space during laparoscopic right hemicolectomy.



Classifications of Henle's Trunk

PODIUM ABSTRACTS

LAPAROSCOPIC VENTRAL MESH RECTOPEXY WITH BIOLOGIC MESH – CASE REVIEW AND VIDEO DEMONSTRATION.

M20

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Purpose/Background: Rectal prolapse is defined as circumferential, full-thickness protrusion of the rectum through the anus. While relatively uncommon in the general population, for those affected, it can severely impact quality of life. Various surgical techniques have been described for the management of rectal prolapse, which can be broadly divided by either a perineal or abdominal approach. Traditionally, abdominal approaches have been favored in good surgical candidates due to improved durability of the repair. Laparoscopic ventral mesh rectopexy has seen a rise in popularity due its reported success rates and improvements over posterior rectopexy. While traditionally performed with synthetic mesh, there has been an increasing interest in the use of biologic mesh to reduce the risk of mesh related complications such as erosion and infection. Current data on ventral mesh rectopexy is primarily limited to retrospective case series. The purpose of this study is to describe our institutional experience, outcomes, and to demonstrate our operative technique for laparoscopic ventral mesh rectopexy using biologic mesh.

Methods/Interventions: An institutional review board approved retrospective review of all laparoscopic ventral mesh rectopexy cases performed by a single surgeon from January 2016 to September 2018 was conducted. The same surgical technique utilizing biologic mesh was performed in all patients. Patient characteristics, information regarding the severity of rectal prolapse, operative, and postoperative outcomes were recorded and analyzed for trends and significance.

Results/Outcome(s): Fourteen cases met criteria for inclusion into the study. There were 11 females and 3 males, with a mean age of 65.1 (SD=18.5). The average BMI was 22.4 (SD=3.1). Five patients (35.7%) had previous operations for rectal prolapse which had resulted in recurrence. All 14 patients (100%) presented with evidence of external prolapse on physical exam. There were no patients with simultaneous multicompartiment prolapse. The most common presenting symptom was fecal incontinence, which was present in 8 patients (57%), followed by constipation in 4 patients (28.6%). The mean operative time was 114.6 minutes (SD=24.7), and no cases required conversion to an open procedure. There were no intraoperative complications, and 1 (7.1%) postoperative complication in a patient who developed prolapsed internal hemorrhoids requiring excisional hemorrhoidectomy on postoperative day 2. After a mean follow up of 73 days (range 13-287 days), 9 patients (64.3%) reported regular bowel movements, 3 patients (21.4%) had constipation controlled by stool softeners, and 1 patient (7.1%) had intermittent fecal incontinence. There was 1 (7.1%) documented recurrence in a patient who

had previously undergone both an Altemeier and Delorme procedure without success.

Conclusions/Discussion: In this video demonstration and case review we demonstrate our technique for laparoscopic ventral rectopexy using biologic mesh. The complication profile and recurrence rate of laparoscopic ventral rectopexy with biologic mesh is similar to that described for laparoscopic ventral rectopexy with synthetic mesh; it is a safe and effective procedure for the management of rectal prolapse.

TRANSANAL MINIMALLY INVASIVE SURGERY (TAMIS) FOR REDO PROCTECTOMY IN PATIENTS WITH CHRONIC ANASTOMOTIC LEAK.

M21

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Purpose/Background: The management of chronic anastomotic leak after low anterior resection continues to be challenging, and often results in the need for a permanent ostomy. Visualization of the deep pelvis in a redo operative field is difficult, as anatomic planes are inconspicuous and tissues fibrotic, limiting exposure. Advantages of the laparoscopic transanal total mesorectal excision (taTME) approach for low and mid rectal cancer include the ability to precisely choose the distal transection site and visualization of dissection planes low in the pelvis, and has been adopted by some experienced surgeons and specialized centers. We present a new role for transanal minimally invasive surgery (TAMIS) as an approach for management of chronic low rectal anastomotic leak, illustrated in the cases that follow.

Methods/Interventions: Two cases at a single academic center in which treatment of chronic anastomotic leak was managed via a TAMIS approach were reviewed. The first is a 54 year old female who underwent a laparoscopic low anterior resection (LAR) and diverting ileostomy via a taTME approach following neoadjuvant chemoradiation for locally-advanced rectal cancer. This was complicated by an anastomotic leak requiring operative washout and drain placement. She developed a chronic sinus tract, treated with serial debridement. Thereafter, contrast enema and flexible sigmoidoscopy suggested anastomotic healing. Her ileostomy was reversed, but she subsequently developed a rectovaginal fistula involving a persisting sinus tract to her anastomosis. The second patient is a 49 year old male who underwent an open LAR with diverting ileostomy following neoadjuvant chemoradiation for locally advanced rectal cancer, which was complicated by an early pelvic abscess requiring a percutaneous drain. A contrast enema 6 months later demonstrated healing of the anastomosis and his ileostomy was reversed. However, he was found to have an anastomotic defect with sinus tract and a large chronic presacral cavity that communicated with the rectal lumen. In both cases,

surgery was performed via a combined open transabdominal and TAMIS approach. The transabdominal dissection was performed first, until poor visualization and inadequate exposure of the deep pelvis secondary to the diffusely fibrotic and immobile nature of tissue prevented further distal dissection. The cases then proceeded in a TAMIS fashion, beginning with the rectum just distal to the prior anastomoses, preserving as much rectum and anal canal as possible, and continuing until the abdominal field was connected circumferentially. Anastomoses were then constructed via double purse string, 29mm stapled end-to-end technique. Both patients were diverted with a loop ileostomy.

Results/Outcome(s): The first patient had acute kidney injury, which resolved with supportive measures, and she was discharged home on post-operative day eight. Interval flexible sigmoidoscopy and contrast enema demonstrated an intact anastomosis at 8 weeks. Her ileostomy was reversed 12 weeks after surgery, and she is doing well with progressive improvement in LAR syndrome. The second patient had an uncomplicated hospital course and was discharged on post-operative day nine, once ileostomy output was less than one liter per day. He developed a small bowel obstruction within a month from surgery, which resolved with non-operative management. Interval flexible sigmoidoscopy and contrast enema demonstrated a healed anastomosis at 12 weeks, he underwent ileostomy reversal 17 weeks following surgery and is doing well.

Conclusions/Discussion: Surgical management of chronic anastomotic leak after LAR is technically challenging, and with appropriate expertise, utilization of an alternative surgical approach can overcome many of these challenges. TAMIS provides direct, in-line and up close visualization of the deep pelvis, particularly when this view is obscured by a narrow inlet, chronic scarring, and lack of tissue pliability. This surgical approach can facilitate both the dissection as well as the ability to preserve the low rectum and sphincter complex to facilitate anastomosis and prevention of a permanent colostomy.

ICG-GUIDED LAPAROSCOPIC LATERAL LYMPH NODE DISSECTION IN RECTAL CANCER.

M22

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Purpose/Background: In Japan, lateral lymph node (LLN) metastasis is considered to be regional metastasis rather than distant metastasis. In our institution, lateral lymph node dissection (LLND) is selectively performed for the rectal cancer patients with LLNs clinically suspected of having metastasis. Technical difficulties can cause incomplete dissection of LLNs, allowing them to remain in the pelvic space. Because near-infrared fluorescence imaging

with ICG provides the real-time information on lymphatic flow, it can be helpful to dissect LLNs completely.

Methods/Interventions: In the present video, we show a novel application of ICG during laparoscopic TME with LLND to prevent incomplete dissection of LLNs.

Results/Outcome(s): ICG was injected around the tumor transanally before surgery. ICG imaging clearly revealed that hypogastric nerve and pelvic splanchnic nerve (S3) were involved in the ICG-stained metastatic LLNs, which was useful for the combined resection. After completing LLND, ICG imaging was performed again to identify the remaining lymph nodes.

Conclusions/Discussion: ICG-guided laparoscopic LLND allows the surgeon to identify LLNs and lymphatic drainage of rectal cancer with high reliability.

EXTENDED RIGHT COLECTOMY WITH COMPLETE MESOCOLIC EXCISION.

M23

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Purpose/Background: Complete mesocolic excision (CME) can offer oncologic benefit in select patients, but the procedure can be technically difficult, especially in an overweight patients with a bulky mesentery. We present a video of a robotic extended right colectomy in an overweight male patient, demonstrating some of our techniques for precise and safe CME.

Methods/Interventions: The patient is a 66 year old male with a bulky transverse colon cancer initially discovered on abdominal exam. CT scan demonstrated no distant metastases, and colonoscopy showed no synchronous lesions. We performed minimally invasive extended right colectomy with complete mesocolic excision, and in this video highlight important anatomical landmarks and methods of exposure and dissection. We concentrate on the medial to lateral dissection, arterial and venous anatomical relationships, and different approaches to the lesser sac from either side of the ligament of treitz.

Results/Outcome(s): The patient recovered well from surgery and went home on postoperative day 4. His pathology demonstrated a T3N1 tumor, and he is receiving adjuvant chemotherapy.

Conclusions/Discussion: Minimally invasive complete mesocolic excision is technically feasible, even in a heavier patients with a more bulky mesentery. Careful attention to pre-operative imaging, vascular anatomical relationships, and complete elevation of the mesentery off of the retroperitoneum facilitates safe dissection.

EPISIOPROCTOTOMY AND PERINEAL RECONSTRUCTION FOR RECURRENT RECTOVAGINAL FISTULA.

M24

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Purpose/Background: Rectovaginal fistula is a challenging problem for the patient and the surgeon. Episioproctotomy can be used in selective patients as a good option for repair of recurrent rectovaginal fistula. This video provides a detailed description of episioproctotomy and perineal reconstruction in a patient with recurrent rectovaginal fistula after multiple failed repair attempts.

Methods/Interventions: We present a 45 year old female who developed a rectovaginal fistula of cryptoglandular origin. She underwent five failed procedures, including a failed vaginal advancement flap after fecal diversion. She had a complex fistula with a branch extending cephalad into the levator complex. We described the technique of episioproctotomy and perineal reconstruction and identify the key points to a successful repair of this recurrent rectovaginal fistula. We also offer some insight into limitations and future function.

Results/Outcome(s): The patient healed her rectovaginal fistula after the episioproctotomy and perineal reconstruction. Her diverting stoma was closed. She had mild changes in continence, controlled with stool modifications. Overall, her quality of life was improved dramatically.

Conclusions/Discussion: Episioproctotomy and perineal reconstruction is an excellent option for recurrent rectovaginal fistula after failed repairs. Proper patient selection and preoperative counseling are paramount. The procedure should be utilized in patients with robust musculature. Long term studies are needed to track changes in continence in these patients over time to monitor the durability of the repair.

PULL-THROUGH CONFORMAL SPHINCTER PRESERVATION OPERATION FOR ULTRA-LOW RECTAL CANCER.

M25

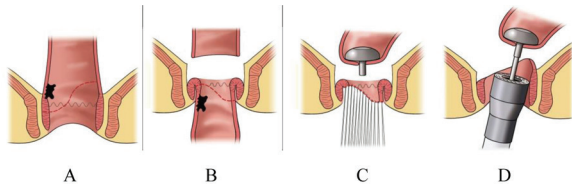
W. Zhang, G. Sun, X. Zhu, Z. Lou, X. Gao, H. Gong,
L. Hao, R. Meng
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Purpose/Background: With the advancement of surgical oncology and instrumentation, intersphincteric resection (ISR) have gained widespread acceptance. However, patients often have poor anal function after operation, the cause may include: 1. The removal most of internal anal sphincter and the dentate line, which are important portions of the anal sphincter complex; 2. Extensive dissect in the intersphincteric space (ISS) to destroy the nerves in ISS. This would lead to significant decrease in postoperative quality of life. In order to overcome this shortcoming, we established a new surgical procedure, the conformal sphincter preservation operation (CSPO).

Methods/Interventions: This film demonstrates the surgical technique for conformal sphincter preservation operation in a 77-year-old man with ultralow rectal cancer (3 cm from anal verge). The preoperative magnetic resonance imaging indicated the tumor with a diameter of 3cm and a stage of T2N0M0. The middle approach was employed. An ultrasonic-knife was used to dissect the sigmoid mesocolon cranially to expose left Told space. While the Group 253 lymph nodes were dissected, the lumbar sympathetic nerves should be protected. Left colonic artery was preserved, with the IMA ligated distal to the level of left colonic artery. The inferior mesenteric vein (IMV) was ligated at the same level. After widening the Told space to the left cranially and caudally, the left ureter and gonadal vessels could be exposed. While dissecting in the retrorectal space, the inferior hypogastric nerves were preserved. Rectum was stretched to the opposite side gently while ligating the lateral ligament along the visceral fascia to protect the pelvic plexus. This technique applied to both sides. After cutting off the Denovelliers' fascia at the bottom of the seminal vesical, the prerectal space was exposed. Dissection was continued caudally until the proximal edge of the levator ani muscle fissure was reached and stopped without cutting off the hiatal ligament or getting into ISS. Transection was made between the rectum and sigmoid colon. The rectum was pulled out with the oval forcep from the lumen and an electric knife was employed to mark the resection line at a distance of 1 cm from the edge of the tumor, which is diagonally upward to the opposite side, retaining more contralateral rectum wall. The intestine was ligated along the resection line with the harmonic scalpel. The distal resection margin was 1 cm. Following the rectal stump closure by interrupted manual sutures, a circular stapler (size 25) was used to perform the anastomosis. The stapler is inserted as high in the rectal stump as possible, to make the anastomosis as high as possible on the opposite. Therefore as much as possible of the dentate line and internal anal sphincter were preserved on the opposite. Temporary ileostomy was performed routinely. A drainage tube was put in the pelvic cavity through the left trocar, without closing the pelvic floor fascia.

Results/Outcome(s): There were no intraoperative complications. The operating took 125 min. Blood loss was 20 ml. The distal resection margin was negative, with the pathological result as pT2N0M0, moderately differentiated adenocarcinoma. Digital rectal examination was carried out 3 weeks after the surgery to prevent the anastomosis stricture and anal sphincter contraction movement was initiated. The ileostomy was closed 3 months after the first operation. The anal function was improved gradually. One year after the reversal, the continence to solids, liquids and flatus was well maintained without much influence on the postoperative lifestyle. No obvious tenesmus or fecal urgency was felt. The anastomosis line was 3 cm above the dentate line after the operation even though the inferior tumor margin was just 1 cm above the dentate line preoperatively. Besides, no local recurrence or distant metastasis was detected until now for 58 months. The postoperative life quality was well preserved compared to the preoperative ones.

Conclusions/Discussion: The conformal sphincter preservation operation can be performed feasibly and safely. It can preserve fecal continence and quality of life without compromising oncological result. More rectum wall, dentate line and anal canal was preserved by the conformal resection, besides, the nerves in the intersphincteric space was left undisturbed as too much dissection in ISS was avoided. Thus, an alternative sphincter preserving procedure (CSPO) to treat early ultra-low rectal cancer was provided, and should be taken into consideration whenever possible.



TRANSANAL EXCISION OF EARLY ANORECTAL NEOPLASIA WITH ENDOLUMINAL ROBOTIC PLATFORM.

M26

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Purpose/Background: Access and visualization can be challenging during transanal excision due to tortuous anatomy and limited space.

Methods/Interventions: This video depicts an endoluminal robotic transanal excision of an early rectal neoplasm.

Results/Outcome(s): An excisional biopsy was performed safely using an endoluminal robotic surgical system. The patient was discharged home post-anesthesia with no issues. Pathology resulted a T2 adenocarcinoma with positive deep margin. A completion low anterior resection was recommended.

Conclusions/Discussion: Early rectal neoplasia can be safely excised with an endoluminal robotic surgical system. Articulating instrumentation and 3D visualization may mitigate anatomic difficulties of transanal surgery. Future studies are needed to validate this new platform.

ROBOTIC RIGHT HEMICOLECTOMY WITH COMPLETE MESOCOLIC EXCISION AND D3 LYMPH NODE DISSECTION.

M27

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Purpose/Background: Recent studies have shown the benefits of complete mesocolic excision and extended lymphadenectomy (D3 lymph node dissection) in patients with colon cancer. A robot-assisted approach for this surgery has not been widely described.

Methods/Interventions: A 70-year-old female was found to have ascending-colon adenocarcinoma during a screening

colonoscopy. No metastatic disease was identified in the staging CT scans. A robot-assisted right hemicolectomy with complete mesocolic excision and D3 lymph node dissection was performed. The trocars were placed in 8-mm ports in the right lower quadrant, suprapubic area, and left upper quadrant. A camera port was placed superior to the umbilicus, and an assistant port (5 mm) was placed in the left lower quadrant. The ileocolic and middle colic vessels were identified along with the intervening superior mesenteric vessels. The dissection began on top of the superior mesenteric vein to include the D3 lymph nodes in the specimen. The ileocolic vessels were dissected and transected at their origin from superior mesenteric vessels. A plane was developed between the mesentery and the retroperitoneum in a medial-to-lateral fashion with intact visceral peritoneum. The right branch of the middle colic artery was transected, followed by transection of the right branch of the middle colic vein arising from the trunk of Henle. The proximal transverse colon and ascending colon were mobilized by taking down lateral attachments. The intervening mesentery was transected, and the right colon was exteriorized by extending the camera port. Proximal and distal transection points on the terminal ileum and transverse colon, respectively, were identified, and the specimen was transected. An extracorporeal side-to-side, functional end-to-end anastomosis was performed.

Results/Outcome(s): Final pathology showed T3N0 adenocarcinoma with all negative margins. Sixteen lymph nodes were retrieved. The patient was discharged on post-operative day 3 without any complications.

Conclusions/Discussion: The robotic approach for right hemicolectomy with complete mesocolic excision and D3 lymph node dissection is safe and feasible. It combines the advantages of the conventional minimally invasive approach (laparoscopy) with the better visualization and greater degrees of freedom offered by robotics, which enhance the surgeon's ability to perform this complex procedure safely.

TRANSPERINEAL TOTAL PELVIC EXENTERATION IN THE PRONE JACKKNIFE POSITION.

M28

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Purpose/Background: For locally advanced, primary T4 rectal cancer, total pelvic exenteration (TPE) is a curative strategy for achieving an R0 resection. We previously presented the Transperineal TPE (TpTPE) procedure in the lithotomy-Trendelenburg position (Lloyd-Davies; LD position) for male patients to achieve en bloc resection of pelvic organs in the 2017 ASCRS Annual Scientific Meeting. The TpTPE in the LD position is superior to the abdominal approach for dividing the urethra and the dorsal vein complex

because of a broader working field without restraints due to the pubic symphysis. However, it is difficult to mobilize all the pelvic organs while maintaining the proper surgical field, and especially to dissect the ischiorectal fossa. From the perspective of pelvic morphology, we used the prone jackknife position (PJK position) for TpTPE to improve the surgical field.

Methods/Interventions: A total of 5 consecutive male patients underwent TpTPE in the PJK position for T4 rectal cancer between March 2018 and September 2018. TpTPE was inevitably accompanied with resection of the levator ani muscle. TpTPE was the surgery of removing the entire pelvic organs while exposing the internal obturator muscle and dividing the internal iliac vessels. During TpTPE in the PJK position, the mobilized pelvic organs spontaneously moved toward the head by gravity and the supplied CO₂ (pneumo-pelvis) without the restraint of the sacral bone, which occurred with the LD position. In particular, isolation and division of the internal iliac vessels became more feasible and easier because of a broader vacant space under the sacrum and no accumulation of blood and fluid. However, it was difficult to stop the bleeding from the internal iliac artery in the PJK position. Therefore, it was necessary to take care not to damage of the internal iliac artery due to difficulty in changing the position faster. In the PJK position, the superficial skin area of the entire sacrum was consequently exposed. Therefore, another access port could be inserted beside the coccyx in addition to the platform. This additional access port could provide proper tension and reduce the collision between the scope and bilateral forceps by keeping these instruments apart. The specimen was extracted through an extended umbilical incision, through which extracorporeal construction of the ileal conduit was achieved.

Results/Outcome(s): None of the TpTPE in the PJK position procedures had to be converted to other surgeries or to the other position. The median surgical blood loss was 80 mL (range, 60-240mL). The median surgical time was 428min (range, 372-556min). The positive circumferential resected margin rate was 0%.

Conclusions/Discussion: TpTPE in the PJK position had the significant advantage of improving the surgical field.

STEP-BY-STEP LATERAL-NODE DISSECTION FOR RECTAL CANCER – TRAINING MINIMALLY INVASIVE SURGEONS IN THE CADAVER LABORATORY AND DIFFERENCES WITH IN VIVO DISSECTION.

M29

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¹Sao Paulo, Brazil; ²Buenos Aires, Argentina; ³Tucuman, Argentina; ⁴Tokyo, Japan; ⁵Daegu, Korea (the Republic of)

Purpose/Background: Lateral-node dissection for rectal cancer has been largely a neglected operation in western countries for decades. Reasons for this may

have included long operative times, challenging anatomy, significant intraoperative blood loss, potential postoperative morbidity and lack of scientific evidence for clinical benefit. Implementation of minimally invasive approach with optimal visualization of structures and recent data provided by randomized clinical trials has brought the procedure to center stage in rectal cancer management for select patients. In this setting, standardization of surgical steps and anatomical landmark identification is crucial. Training of surgeons and resident in the cadaver lab may offer an excellent opportunity for this particular purpose.

Methods/Interventions: A cadaveric dissection of the right lateral internal iliac and obturator areas was performed and recorded. The video was edited to provide didactic information related to the anatomical landmarks and resection of the fat-containing lymphatic tissues. Specific features associated with the cadaver dissection in contrast to human in vivo dissection are highlighted.

Results/Outcome(s): The present video illustrates the most relevant surgical steps to perform lateral node dissection in the cadaver using sharp dissection and minimally invasive laparoscopic instruments. The right ureter is identified and retracted using a vessel loop. Here, the first striking difference with in vivo dissection relates to the challenging identification of the ureter in the cadaver. Even though this step of the procedure by quick in vivo when the ureter crosses the iliac vessels, in the cadaver precise identification of the ureter may be tedious. Opening of the peritoneal sheath allows access to lateral node compartment and should reach the vas deferens in male and round ligament in female patients. (Step 1) Dissection of the vesico-hypogastric fascia determines the medial boundary of dissection (Step 2). Identification of the common iliac vein will guide the lateral boundary of dissection with subsequent identification of psoas and internal obturator muscles (Step 3). Ligation of communication with lymphatics to inguinal area will allow identification of obturator nerve and obturator vessels (Step 4). Another important difference with in vivo dissection is related to the identification of the obturator vessels entering the obturator foramen. In the cadaver, failure to identify such vessels is common. Following blunt dissection of obturator nerve, proximal connections with lymphatics from common iliac area are also ligated (Step 5). Umbilical artery is skeletonized to allow identification and clearance of fatty tissue along superior vesical arteries, internal iliac artery/vein, inferior vesical artery and internal pudendal artery (Step 6). Even though superior and inferior vesical arteries are quite robust and easy to identify in vivo, their identification during cadaveric dissection may be challenging and often impossible.

Conclusions/Discussion: Cadaveric model provides excellent training opportunity for lateral node dissection training. Surgical steps are quite similar to actual lateral node dissection in vivo. Specific steps of the procedure may be more challenging in the cadaver including ureter,

obturator vessels and vesical (inferior and superior) vessels. Videos should provide surgeons and residents an opportunity to review a standardized approach to this procedure.

LAPAROSCOPIC LATERAL-NODE DISSECTION FOR RECTAL CANCER SEE ONE, DO ONE AND TEACH ONE?

M30

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Purpose/Background: The risk of lateral node metastases may be quite significant in locally advanced (cT3/cT4) extraperitoneal rectal cancer. Even in the setting of neoadjuvant chemoradiation, there is evidence that ≥ 5 mm lymph nodes in lateral compartment remain positive and should be removed. However, western countries have resisted to implement this procedure into routine practice. Reasons for this include the significant complexity of the procedure, risk of intraoperative bleeding and potential postoperative consequences. Minimally invasive surgery may have resolved these issues by providing optimal anatomical view, sharp dissection with minimal bleeding and nerve-sparing technique with little risk for significant functional consequences. By providing a standardized step-by-step approach, the technique may be amenable to full implementation in western countries with short learning curves and excellent surgical outcomes.

Methods/Interventions: The present video illustrates the most relevant surgical steps to perform lateral node dissection using sharp dissection and minimally invasive laparoscopic instruments. A 56-year-old male with distal rectal cancer underwent neoadjuvant CRT for a mrT3cN2M0 mrEMVI+ mrCRM+ disease. There was one left obturator node of 6mm prior to CRT. Following 12 weeks of CRT completion, the patient underwent taTME for the primary disease followed by left lateral node dissection by laparoscopy.

Results/Outcome(s): The procedure has been didactically divided into 7 steps. The left ureter is identified and retracted using a vessel loop. Opening of the peritoneal sheath allows access to lateral node compartment and should reach the vas deferens in male and round ligament in female patients (Step 1). Dissection of the vesico-hypogastric fascia determines the medial boundary of dissection. Identification of the common iliac vein will guide the lateral boundary of dissection with subsequent identification of psoas and internal obturator muscles (Step 2). Identification and dissection of accessory vessels.

(Step 3) Ligation of communication with lymphatics to inguinal area will allow identification of obturator nerve and obturator vessels (Step 4). Following blunt dissection of obturator nerve (Step 5). Identification and ligation of obturator vessels. (Step 6) Umbilical artery is skeletonized to allow identification and clearance of fatty tissue along superior vesical arteries, internal iliac artery/vein, inferior vesical artery and internal pudendal artery (Step 7). Postoperative course was uneventful.

Conclusions/Discussion: Standardization of lateral-node dissection for rectal cancer has paramount importance. The technique with minimally invasive approach provides optimal anatomical view and allows safe dissection of the nodes of interest.

MECHANICAL FINDINGS DURING REDO IPAA REFERRED TO AS “CROHN’S OF THE POUCH”.

M31

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Purpose/Background: Two to 7 percent of the pelvic pouches for presumed ulcerative colitis are complicated with Crohn’s disease (CD) in long-term follow-up. However, the majority of the pouches who were treated as CD have been shown to have mechanical problems that explain their symptoms. Our group has found that if the interval between the index pouch to the symptoms occurs in less than 1 year, our suspicion for mechanical pathology is high.

Methods/Interventions: In our case, we present a 31-year-old female who had an ileal J pouch anal anastomosis followed by persistent pain with obstructive defecation. She had been treated with multiple biologics and undergone multiple dilations for anastomotic stricture at the IPAA.

Results/Outcome(s): Following a pouchoscopy which showed a possible pouch twist and an exam that showed an anastomotic stricture, we diverted the patient with a thoughtful ileostomy. Upon redo pouch, we have found that ileocolic pedicle had been extremely low ligated causing pouch-tension and eventual stricture, leading to a dilated pouch that was pseudo-twisted in the pelvis causing additional obstruction. After excision of the prior pouch and re-do J pouch construction, her symptoms have substantially improved.

Conclusions/Discussion: We believe that, patients who were considered as having CD of the pouch should have a complete assessment in specialized centers before starting biologics. A short interval between the primary operation and symptoms to occur should alarm the health-care providers.

ONGOING VIDEO ROOM

TRANSANAL WOUND VAC DRAIN FOR ANASTOMOTIC LEAK AFTER ILEO-ANAL ANASTOMOSIS.

VR17

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Purpose/Background: The vacuum-assisted closure (VAC) system has many applications in managing complex wound healing. It quickens the recovery period by its hyperemic effect on the exposed zone, decreasing bacterial colonization, preventing tissue edema and promoting granulation of the wound. However, its use in anastomotic leakage after ileal pouch anal anastomosis is scarcely studied, especially since a proprietary transanal wound VAC was removed from the U.S. market.

Methods/Interventions: We applied a bespoke transanal wound VAC using the existing standard wound VAC supplies to two patients who developed anastomotic leakage and presacral abscess after completion proctectomy with J pouch construction.

Results/Outcome(s): We changed the transanal wound VAC drains every 2-3 days and both patients had substantial improvements in their abscesses with 20 days/7th application.

Conclusions/Discussion: Anastomotic leak at the IPAA traditionally took up to 6 months to heal which causes a serious toll on the psychosocial life of the patient. Therefore, we believe that facilitating the healing process via using our bespoke transanal wound VAC drain might have a great value to improve patient's quality of life.

ROBOTIC INTESTINAL VAGINOPLASTY FOLLOWING RECTO-NEOVAGINAL FISTULA AFTER PENILE INVERSION VAGINOPLASTY IN A TRANSGENDER PATIENT.

VR1

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Purpose/Background: Purpose/Background: Gender confirmation surgery is on the rise and male to female transition involves penectomy with inversion of penile and scrotal skin to create a neovagina. Colorectal surgeons can be requested for intraoperative rectal perforations, rectal-neovaginal fistulas and for revision procedures following neovaginal stenosis.

Methods/Interventions: We present a 33-year-old transgender patient who underwent a gender confirmation surgery involving penile inversion which resulted in a rectal perforation that was primarily repaired. Following the procedure, the patient developed a fistula between the rectum and the neovagina for which an ileostomy was

created. A transanal repair was attempted for the persistent fistula, however the patient developed a complete obliteration of the neovagina. We describe our technique for a corrective operation that involved robotic excision of cutaneous graft from the anterior mesorectal compartment, intestinal harvest, widening of the pelvic floor hiatus and subsequent reconstruction.

Results/Outcome(s): Excellent functional outcomes were noted following the reversal of the ileostomy.

Conclusions/Discussion: Redo gender reassignment surgery is challenging and the anatomy difficult to delineate. Dissecting known mesorectal borders first, can help identify anatomical reference points. Flexible sigmoidoscopy and neovaginal probing can aid in the dissection. Occasionally the contour and symmetry of the mesorectal compartment can be the only markers for a safe dissection. A reversed, distal sigmoid colon can serve as an excellent replacement graft.

LAPAROSCOPIC EXTRAPERITONEAL COLOSTOMY CREATION.

VR2

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Purpose/Background: Parastomal hernia is a common problem following colostomy creation, with greater than one in four patients affected in some studies. Systematic review and meta-analyses have demonstrated significantly lower rates of parastomal hernia development in extraperitoneal colostomy creation compared to the transperitoneal approach. Here we present a novel technique for laparoscopic extraperitoneal colostomy creation that recapitulates the open approach, illustrated in the case that follows.

Methods/Interventions: The patient depicted is a 33-year-old male who was diagnosed with locally advanced low rectal cancer upon work-up for hematochezia. He underwent neoadjuvant chemoradiation therapy followed by laparoscopic abdominoperineal resection. The colostomy was created laparoscopically in an extraperitoneal fashion via the following technique. After proctectomy and closure of the pelvis, pneumoperitoneum is reestablished. The location of the preoperatively marked colostomy site is identified intraabdominally by instillation of local anesthesia via a spinal needle just superficial to the peritoneum. Starting at the corresponding level, a tunnel is developed in the preperitoneal space, starting from the lateral abdominal wall where the peritoneum was divided to mobilize the colon. Utilization of a laparoscopic gastric band passer facilitates portions of the dissection, and its ability to articulate is helpful given the trajectory necessary to reach the anterior abdominal wall at the colostomy site. Once the dissection nearly connects to the aforementioned

wheel of local anesthesia, the colostomy incision is made. The anterior fascia is divided in a cruciate fashion and the rectus muscle is split with a Kelly clamp and retracted anteriorly. A curved long Kelly clamp is passed into the preperitoneal space at the lateral edge of the rectus muscle until it appears that the laparoscopic and open preperitoneal planes are connected. In some patients, the presence of the posterior rectus sheath will require this fascia to be incised at the level of the semilunar line in order to enter the preperitoneal laparoscopic dissection. Care should be taken to ensure an extraperitoneal tunnel wide enough to accommodate the colon and with no acute angles that would predispose to obstruction. The colon is then grasped through the colostomy site with a laparoscopic grasper, passed through the tunnel, and the colostomy matured.

Results/Outcome(s): The patient recovered well and was discharged on post-operative day four. Pathology demonstrated a complete pathologic response. He completed adjuvant chemotherapy and has no evidence of a stricture, stoma retraction, or parastomal hernia nearly one year post-operatively.

Conclusions/Discussion: Creation of an extraperitoneal colostomy has been shown in open literature to decrease rates of parastomal hernia formation compared to the transperitoneal approach, however it has not routinely adopted in laparoscopic surgery due to perceived technical limitations. Laparoscopic extraperitoneal colostomy creation is feasible via the novel technique described above, and can be performed in a manner that replicates the open approach. Long-term follow-up of a large patient cohort may be necessary to determine if this technique impacts the rate of parastomal hernia development, as may be anticipated given the corresponding literature in open permanent colostomy creation.

REPAIR OF RECTOVAGINAL FISTULA: MODIFIED MARTIUS FLAP.

VR3

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Purpose/Background: Rectovaginal fistulas often represent a difficult condition for patients and surgeons. The bulbocavernosus fat flap also called the modified Martius flap is a useful surgical technique for repairing low rectovaginal fistulas. We present a four minute video with step by step surgical technique and approach to a modified Martius flap for the repair of a low rectovaginal fistula.

Methods/Interventions: Step by step 4 minute video showing a modified Martius flap repair for a low rectovaginal fistula.

Results/Outcome(s): We present a video of a modified Martius flap repair on a 72 year old female that developed a low rectovaginal fistula after an eroded pessary.

Conclusions/Discussion: The modified Martius flap is a useful surgical procedure for the repair of low rectovaginal fistulas. It should be part of the armamentarium of all colorectal surgeons.

A STANDARDIZED APPROACH TOWARDS LIGATING THICKENED CROHN'S MESENTERY.

VR18

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Purpose/Background: Thickened Mesentery from Crohn's disease poses a challenge to hemostasis for energy devices due to the amount of tissue that needs to be sealed. Attempts to isolate the vessels in the mesentery can be quite difficult due to the enlarged lymph nodes and can cause a lot of bleeding which may result in higher ligation of vessels and subsequently more bowel resected unnecessarily. We demonstrate a standardized method to dividing thickened Crohn's mesentery in a safe and efficient manner.

Methods/Interventions: Using Kocher clamps sequentially applied to the proximal mesentery and Kelly clamps sequentially placed on the distal mesentery we divide the bowel with scissors. We then use 0 Vicryl sutures to place U-stitches in the mesentery to control each Kocher clamp that was placed proximally. The sutures are placed from the tip of the most recently placed Kocher clamp to the tip of the previously placed Kocher clamp to ensure the all the vessels are secured in a systematic manner. Kocher clamps are released sequentially after each U-stitch is placed.

Results/Outcome(s): We present the case of a 48-year-old female who underwent an ileocolic resection and for Crohn's disease of the terminal ileum. Her mesentery was very thickened and diseased and was efficiently and effectively controlled with this standardized approach to mesenteric ligation. She did well post-operatively and was discharged home on postoperative day 2.

Conclusions/Discussion: Using this method to divide the diseased and thickened mesentery is very efficient and safe. It is any easy technique to apply and use when vessel sealing devices do not provide adequate hemostasis due to the thickness of the mesentery or when isolating individual vessels is too problematic. This standardized technique can help prevent intraoperative bleeding and prevent unnecessary bowel resections from high ligations of the mesentery from mesenteric hemorrhage control.

FOUR DIFFERENT APPROACHES TO LAPAROSCOPIC REDO SURGERY IN RECURRENT ILEOCOLONIC CROHN'S DISEASE.

VR19

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Purpose/Background: Over 80% of patients diagnosed with primary ileocolic Crohn's disease have a surgical resection within 10 years of their diagnosis. Of these, 30 to 50% will have symptomatic recurrence of disease during the first 5 years and more than 30% of patients undergoing surgery for Crohn's disease are likely to need further operations within 10 to 15 years for recurrence commonly occurring at the anastomotic site or in the neoterminal ileum. Minimally invasive surgery in Crohn's disease can be particularly challenging due to multifocal disease with extensive inflammation and a thickened mesentery, the potential for abscesses, fistulas and phlegmons, and lack of tactile feedback. High conversion rates have been reported in reoperative surgery for recurrent Crohn's disease with abscesses and adhesions representing the main reasons for conversion. In this video we present four different approaches to laparoscopic mobilisation of the ileocolonic anastomosis for recurrent Crohn's disease of the neoterminal ileum.

Methods/Interventions: The sites of previous abdominal scars are marked and the first trocar is inserted via an open Hassan technique away from the midline, in the left lower quadrant lateral to the rectus. The peritoneal cavity is inspected and preliminary division of adhesions is often necessary. Having available in theatre a 30 degree 5mm laparoscope, can be useful to insert additional 5mm trocars at a point of convenience free from adhesions to move the laparoscope easily between the operating ports to obtain the best possible angle to facilitate adhesiolysis with cold sharp dissection. Often the dilated bowel can be followed till the anastomosis. Full mobilisation of the anastomosis is necessary for extracorporeal division and anastomosis.

Results/Outcome(s): In this video we demonstrate four different strategies for bowel mobilisation in recurrent ileocolonic Crohn's disease: "medial to lateral", "sub-ileal", "lateral to medial" and transverse colon "top to down". A lateral to medial approach is often advocated in laparoscopic redo Crohn's disease surgery, and allows satisfactorily mobilization of the ileocolic segment for an extracorporeal division. The "top to down" transverse colon first technique allows identification of the retroperitoneal structures from above in obese patients or when dilated bowel or adhesions obscure the identification of the duodenum.

Conclusions/Discussion: Colorectal surgeons must be familiar with different strategies in reoperational Crohn's disease surgery in order to adapt the surgical technique to the intraoperative findings.

POSTERIOR BILATERAL PARAMEDIAN APPROACH TO DEEP POSTANAL SPACE ABSCESS WITH BILATERAL HORSESHOE EXTENSION.

VR4

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Purpose/Background: The modified Hanley procedure has been the mainstay of surgical treatment for deep postanal space (DPAS) abscess and fistula. Cadaver dissection of the postanal region illustrates the limited space of Courtney on the posterior midline with adjacent bilateral capacious posterior ischioanal spaces. These anatomical characteristics may explain why the posterior ischioanal space lesions tend to be more prominent than the Courtney space lesions in DPAS abscesses with horseshoe extension. In such cases, the posterior paramedian approach may provide more prolonged dependent drainage than the posterior midline approach. This video aims to demonstrate initial posterior bilateral paramedian drainage of DPAS abscess with bilateral horseshoe extension, followed by core fistulectomy and closure after a 9-month interval.

Methods/Interventions: This 32-year-old male patient has a history of coccygeal pain managed with antibiotics three months ago. He subsequently developed recurrent coccygeal pain five days ago, which has progressively worsened. The patient is a non-smoker with a BMI of 22kg/m² and generally healthy. Physical exam revealed deep-seated tender induration in the bilateral ischioanal spaces with tender fluctuation at the perineum. Endoanal sonography revealed postanal transsphincteric hypoechoic density with bilateral ischioanal extension. An examination under anesthesia was performed with the patient in the prone jackknife position with the buttocks taped apart. The primary opening was identified in the posterior midline. The most fluctuant portion at the perineum was drained first. A stepwise counter incision was made on the anterior portion of the left anterior ischioanal space. The left posterior ischioanal space was drained through an elliptical left posterior paramedian incision, the apex of which was pointed to the primary opening in the posterior midline. Using a closed needle holder, the Courtney space was explored to the level of the right posterior ischioanal space. A right posterior paramedian incision was used to drain the deep-seated abscess cavity adjacent to the Courtney space. The primary opening and its duct were then cored out to the Courtney space without severing the sphincter muscles. A second counter incision was made on the right lateral ischioanal space. A 3-0 nylon paramedian seton was placed through the primary opening, encircling the internal and external sphincter muscles distal to the primary opening. Lateral draining setons were placed. Minimal drainage without hard induration around the postanal region was achieved after a 9-month interval. At that time, a core fistulectomy was undertaken under caudal anesthesia with

the patient in the prone jackknife position. Lateral setons were removed, and the external openings were enlarged to allow for drainage. The fistula tract along the left paramedian seton was carefully cored out through the left posterior paramedian incision, followed by coring of the right paramedian and Courtney space tracts. Finally, the intramuscular tract was cored out. The remaining intramuscular defect was closed using two figure-of-eight 3-0 absorbable sutures. A step-by-step approach is presented in this video. Photos from the cadaver dissection are featured to illustrate the anatomical structures and spaces in the postanal region. Preoperative endoanal ultrasound and intra-operative anatomical landmarks are detailed.

Results/Outcome(s): After initial drainage, the patient was discharged on postoperative day 1. Follow-up consisted of office visits once/week for three weeks for wound care and to ensure there were no signs of premature closure with recurrent indwelling cavities. The patient was followed up for 9 months thereafter, at which time minimal discharge without hard induration in the postanal and bilateral posterior ischioanal spaces was achieved. After core fistulectomy and muscle layer repair, the patient was discharged on postoperative day 1. He was followed up weekly for 3 weeks and then biweekly thereafter until the external openings were closed at postoperative week 9. At the 23-month follow-up, the patient was continent and without recurrence.

Conclusions/Discussion: The posterior paramedian approach to DPAS abscess and fistula allows for prolonged dependent drainage, leads to a successful sphincter-sparing procedure, and can be an alternative to the posterior midline approach of the modified Hanley procedure.

RESECTION OF COMPLEX POLYPS UTILIZING AN ENDOLUMINAL TISSUE RETRACTION SYSTEM.

VR5

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Purpose/Background: Oncologic colon resection is frequently performed for complex benign polyps not amenable to simple endoscopic polypectomy due to size or anatomic location. Even with a laparoscopic approach, colectomy is associated significant morbidity for the patient and cost to the health system. Advanced techniques including endoscopic mucosal resection and endoscopic submucosal dissection have attempted to address this problem. Unfortunately, adoption of these techniques by colorectal surgeons has been limited. These procedures are technically difficult, and limited by poor visibility as well as the inability to provide the traction and tension during dissection with which most surgeons are familiar. Newer technologies for endoluminal surgical intervention (ELSI) aim to overcome these limitations, potentially enabling wider adoption. Our objective is to describe our initial experience and demonstrate the technique for successful

resection of complex polyps utilizing an endoluminal tissue retraction system.

Methods/Interventions: We reviewed prospectively collected data for a series of 3 cases in which patients underwent ELSI for resection of large complex polyps or benign appearing lesions. Lesions were located in the left colon or sigmoid at a distance not amenable to transanal excision. In addition to the endoluminal approach, patients were offered an option for traditional oncologic surgical resection. The ORISE™ endoluminal tissue retraction system was employed for all cases. Once lesion location was confirmed by flexible endoscopy, the over-the-scope device was inserted and provided a stable intraluminal working space. The platform allows two independent articulating instruments that function to retract the lesion during dissection, providing valuable traction and counter-traction. Submucosal injection of saline was used to lift the lesion and a submucosal dissection was performed to remove each lesion. The freed specimens were retrieved from the colon using a Roth net.

Results/Outcome(s): Three patients underwent ELSI utilizing the endoluminal tissue retraction system for benign-appearing left-sided lesions. Complete resection of the targeted lesion with was achieved in all cases. Lesions were located at a mean distance from the anal verge of 17cm (range: 15-20cm). There were no intraoperative complications and no patients required subsequent colectomy. Mean OR time was 183.7 minutes (range: 93-239 minutes). The mean estimated resection area was 63.9cm² (range 28-113cm²). There was no significant observed morbidity, with zero reported post-operative complications. One case required laparoscopic lysis of adhesions and colon mobilization to allow device deployment at the target lesion. The median length of hospital stay in our cohort was 1 day (range: 1-2 days). There were no cancers identified on final pathology.

Conclusions/Discussion: Endoluminal Surgical Intervention (ELSI) utilizing an endoluminal tissue retraction system for resection of complex polyps is safe, effective and avoids colectomy for benign polyps. Utilization of the technique allows improved visualization with adjustable traction and tension during dissection, which may encourage wider adoption among colorectal surgeons.

COMPLETE OCCLUSION OF LUMEN AFTER OVER-THE-SCOPE-CLIP DEPLOYMENT DURING ESD. A LESSON LEARNED.

VR6

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Purpose/Background: This is a 19-year-old male with PMH of metastatic desmoplastic small round cell malignancy of the peritoneum during childhood. At that time, he underwent chemo and radiation therapy to the whole

chest and abdomen as well as autologous bone marrow transplant. This was complicated by chronic enterocolitis, malnutrition requiring TPN, chronic renal failure and chylothorax. A recent colonoscopy revealed multiple colonic polyps few with low grade dysplasia and one 30mm polyp at the recto-sigmoid junction with high grade dysplasia. For this large recto-sigmoid polyp deep biopsies were taken from the center of the lesion. He then was referred to our Institution for ESD.

Methods/Interventions: The colonoscope with the distal disposable cap applied was introduced through the anus, full colonoscopy was performed and the lesion was located. After injection of solution with hydroxyethyl starch, methylene blue and epinephrine, endoscopic submucosal dissection was continued along the margin of the lesion using Dualknife electrocautery. A clear central scar difficult to lift was noted. This was thought to be related to patient history of radiation therapy as well as multiple deep biopsies. Decision is made to complete the polypectomy with hot snaring technique. A clear site of perforation was immediately appreciated. Chyle leak from the abdominal cavity was seen. The colonoscope was withdrawn and OVESCO clip was mounted. The scope was reinserted and OVESCO clip was deployed at perforation site using gentle suction. After deployment of the clip, the bowel lumen could not be visualized proximally. Since concern for complete occlusion from OVESCO device, exploratory laparoscopy was performed. A supraumbilical 12mm balloon-port was inserted followed by a right lower and right upper quadrant 5 mm ports. An area completely puckered-in identified at the level of the recto-sigmoid junction with complete obstruction. Using a combination of cold/hot scissors, the damaged anterior wall of the sigmoid-colon and Ovesco clip were completely excised. OVESCO clip was removed through the 12 mm camera-site under direct vision. Because the excision of the clip left an anterior wall defect of about 60% of the circumference intracorporeal suturing was used to fashion a two layers primary anastomosis and figure-of-eight sutures for reinforcement of corners. At the end of the procedure, an intraoperative colonoscopy was repeated to check anastomosis and leak test was negative.

Results/Outcome(s): A 37 mm sessile polyp at the recto-sigmoid junction is completely removed. Pathology showed tubular adenoma with high grade dysplasia with no evidence of carcinoma at the site of central scar. The patient was discharged home after 3 days without immediate or post-operative complications.

Conclusions/Discussion: Complete occlusion of lumen after Over-the-scope-clip deployment during Endoscopic Submucosal Dissection is not the end of the road. It can be safely managed with laparoscopic resection of the clip and intracorporeal anastomosis.

HOUSE FLAP ANOPLASTY.

VR7

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Purpose/Background: A 52 year old male presented with several years of painful bowel movements and difficulty with defecation that frequently required digital manipulation. He had a history of hemorrhoidectomy 15 years prior. On digital exam, the fifth finger was unable to be introduced due to pain and severe anal stenosis. During exam under anesthesia, significant scarring was seen, most profound in the posterior and right quadrants, with relative sparing anteriorly. The stricture extended both proximal and distal to the dentate line.

Methods/Interventions: A broad based house flap was chosen for island flap repair. The scar tissue was first completely removed to ensure that the flap edges could be sutured to well vascularized, scar-free areas. The patient's internal sphincter was noted to be hypertonic and thick, and a partial lateral internal sphincterotomy was performed. The flap was incised sharply down to the subcutaneous tissue. The flap attachments were released using the cut function on the electrocautery to avoid tissue necrosis. The under edges of the donor site were slanted obliquely outwards to avoid undermining of the flap and allow for a broad fat pedicle with adequate perfusion. Once the apex of the flap was released laterally on the buttock, the flap was sewn into place with 3-0 absorbable suture in simple interrupted fashion 2-3 centimeters apart. The suture was placed through the skin and subcuticular layer of the flap and the full thickness of the donor skin to maintain a good blood supply and to not tear the flap skin. The donor site was closed with simple interrupted sutures in a linear fashion to help hold the flap in the anal canal and reduce tension. A medium Hill-Ferguson anoscope was able to be easily placed into the anus at the completion of the anosplasty.

Results/Outcome(s): The patient was discharged the day after surgery. At one month follow-up, he reported occasional hard stools but otherwise normal defecation. He no longer had pain with bowel movements, and his flap had healed without ischemia or necrosis.

Conclusions/Discussion: House flap anoplasty is a good option for patients with moderate to severe anal stenosis. The broad base avoids having an apex that is prone to ischemia and increases the anal canal diameter. It can be performed in conjunction with lateral internal sphincterotomy for patients with combined anatomical and functional stenosis.

RECTO-URETHRAL FISTULA REPAIR WITH ENDORECTAL ADVANCEMENT FLAP AND BIOLOGIC MESH.

VR8

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Purpose/Background: Recto-urethral fistulas are an uncommon complication of prostatectomy. The estimated incidence ranges from 0.1-3% of patients who undergo treatment for prostate cancer. Although conservative therapy should be attempted, most cases of recto-urethral fistulas require surgical repair for definitive treatment. Methods for repair have varied over the years without a consensus on the ideal approach. Here we present the transanal repair of a recto-urethral fistula with endorectal advancement flap and implantation of biologic mesh.

Methods/Interventions: Pre-operatively, the patient had fecal/urinary diversion in the form of a diverting ileostomy and suprapubic catheter. He also had a foley catheter placed by urology three days prior to surgery to guide in the repair. On the day of surgery, the patient was positioned in the prone jack-knife position. Digital rectal exam revealed a 2 cm anterior defect in the rectal wall roughly 6 cm from the anal verge. A Fansler anoscope was used to visualize the defect. The bladder mucosa and the balloon of the foley catheter were visible through the defect. Electrocautery was used to create full-thickness rectal advancement flaps by carefully dissecting the plane between the anterior rectum and bladder. Once adequate mobilization of the rectal flaps was achieved, the bladder was then re-approximated to the proximal urethra with 3-0 PDS sutures in an interrupted fashion. Once the bladder was repaired, a biologic mesh was fashioned to cover the area of the defect. The mesh was anchored into place with interrupted 3-0 PDS sutures. The endo-rectal advancement flaps were then re-approximated over the mesh using interrupted 2-0 vicryl sutures.

Results/Outcome(s): Post-operatively, the patient's hospital course was uneventful and he was discharged home the day after surgery. On outpatient follow-up, flexible sigmoidoscopy was performed and showed a well-healed rectal flap with no signs of recurrence. Lower GI was also completed and showed no signs of contrast extravasation to indicate a persisting/recurrent fistula. The foley catheter was removed 6 weeks post-operatively and the ileostomy was reversed 12 weeks later.

Conclusions/Discussion: Rectourethral fistulas are an unfortunate complication of prostatectomy. Surgical intervention is often required for successful management. Multiple approaches have been described, however an optimal technique has to be elucidated. Here we present a transanal method for recto-urethral fistula repair using both an endorectal advancement flap and implantation of a biologic mesh. This particular technique makes use of a three-layered repair (closure of the bladder defect, implantation of biologic mesh, rectal advancement flap) to help minimize the risk of recurrence.

ROBOTIC MANAGEMENT OF CHYLE LEAK DURING RIGHT COLECTOMY: VIDEO VIGNETTE.

VR22

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Purpose/Background: We present a video of management of chyle leak during robotic right colectomy. A 53-year-old male with a BMI of 32.7 kg/m² with complaints of persistent lower abdominal pain, dark stools, loss of appetite, and a 5 to 6 pound weight loss over the prior few months underwent workup and was diagnosed with iron deficiency anemia. Colonoscopy showed a large fungating mass at the hepatic flexure approximately 4 to 5 centimeters (cm) in size. Biopsies revealed low-grade (moderately differentiated) invasive adenocarcinoma. Staging workup was negative. Patient then underwent a minimally invasive right colectomy using the robotic approach.

Methods/Interventions: During dissection of the medial to lateral plane, copious amounts of whitish fluid began to accumulate in the operative field. This fluid was identified as chyle and attempts were made to control the leak using bipolar cautery and suture ligation with 3-0 vicryl, figure-of-eight stitches.

Results/Outcome(s): Chylostatics was achieved with suture ligation and the rest of the procedure was completed uneventfully. Final pathology revealed invasive adenocarcinoma, stage IIIB. Tumor size was 6.0 x 3.7 x 1.5 cm and 37 nodes were removed, 2 of which were found to be positive for malignancy (pT3N1b). Patient had an uneventful recovery and was discharged on postop day 2 and subsequently started chemotherapy 4 weeks after the operation.

Conclusions/Discussion: Chyle leak is an infrequent complication following right colectomy. This video illustrates that the careful visualization and identification of the lymphatic vessels can help to prevent post-operative morbidity.

REMOVAL OF A LARGE RECTAL LESION WITH ENDOSCOPIC SUBMUCOSAL DISSECTION USING A NEW ENDOLUMINAL PLATFORM.

VR23

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Purpose/Background: Endoscopic submucosal dissection can be technically challenging and innovative platforms that enable stabilization and tissue retraction can assist with this demanding technique.

Methods/Interventions: Here we present removal of a large rectal lesion with endoscopic submucosal dissection using a new endoluminal platform. The patient is a 46 year old male found to have a 65 mm polyp in the rectum extending proximally which was not amenable for

conventional endoscopic removal. He was referred to our center for endoscopic submucosal dissection.

Results/Outcome(s): After inserting the distal disposable cap, the colonoscope was introduced and the lesion was located. The solution was injected into the submucosal space to create a cushion in this plane. Dissection with dual knife was started and continued along the borders of the lesion circumferentially ensuring negative gross margins. After the horseshoe shaped dissection into submucosal plane was performed for several millimeters, the platform was introduced. The cage-like structure was positioned at the level of the lesion and was manipulated to allow stabilization of the lumen. Tissue grasper was introduced through the instrument guide and was used to grasp and retract the tissue therefore assisting in submucosal dissection. Subsequently the dissection assisted by the platform was completed with en-bloc removal of the lesion and here you can appreciate the resection site.

Conclusions/Discussion: 3 hemostatic clips were applied in the end of the procedure and the patient was discharged home on the same day with no complications. The total resection time was 50 minutes. New platforms that enable application of surgical principles such as lumen stabilization and tissue retraction, can refine endoluminal surgery and carry it a step further, resulting in more precise dissections and improved proficiency.

LAPAROSCOPIC ACCESS TO THE SUPERIOR MESENTERIC VEIN FOR OPTIMAL D2 OR D3 DISSECTION IN PROXIMAL COLON CANCER – STEP-BY-STEP APPROACH IN ORDER TO MINIMIZE RISK OF INJURIES TO THE SUPERIOR MESENTERIC VESSELS.

VR24

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Purpose/Background: D3 dissection is the lymph node dissection for proximal colon cancer in eastern countries. Even though there is data to suggest oncological benefit of this approach for all stages of the disease, the procedure is less popular in the western world. One of the reasons for the slow uptake of this procedure is related to the potential risk of vascular injuries to the superior mesenteric vessels. In this setting, standardization of surgical steps and anatomical landmark identification is crucial for a safe approach to optimal D2 or D3 dissection in these patients.

Methods/Interventions: A 63 year-old female patient with an adenocarcinoma of the cecum and no evidence of metastatic disease is illustrated here for the intraoperative steps. Using a laparoscopic approach (5 trocars), the steps for approaching the ileocolic vessels at the origin of the superior mesenteric vessels is demonstrated.

Results/Outcome(s): Instead of a medial to lateral approach where the first step of the operation is the vessel ligation, laparoscopic optimal D2 or D3 dissection should begin by identification of the mesocolic-retroperitoneal limit at the level of the right iliac vessels. Precise incision of the avascular plane will separate the mesocolon anteriorly leaving the retroperitoneum with its structures posteriorly. An angel-hair plane very similar to the holy TME plane is identified and dissection is carried out until the 3rd portion of the duodenum and Gerota's fascia are fully visible. Care should be taken not enter posteriorly to the duodenum. Once this is completed, traction to the ileocolic vessels will allow the creation of a window by incising medially from the distal ileum towards the main vascular trunks. Sharp dissection here will allow precise identification with full exposure of the anterior aspect of the superior mesenteric vein. Full clearance of the lymphatic tissue here provides exact identification of the point of entry for ileocolic vein and artery. Central ligation with or without clearance of the tissue along the superior mesenteric vein provides a safe approach for an optimal D2 or D3 dissection of these vessels.

Conclusions/Discussion: Standardization of the laparoscopic access to the superior mesenteric vessels for optimal D2 or D3 dissection in proximal colon cancer requires an alternative approach to the usual medial-lateral strategy. Here, the inferior-superior dissection with full mobilization of the colon prior to vascular ligation provides a safe technical strategy for this particular purpose.

TRANSPERINEAL REPAIR WITH SPHINCTEROPLASTY OF A RECTOVAGINAL FISTULA IN A CROHN'S PATIENT AFTER TRAUMATIC VAGINAL DELIVERY.

VR37

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Purpose/Background: Rectovaginal fistulas continue to be a complex pelvic floor issue in colon and rectal surgery which require a multi-disciplinary approach in order to care for the patient. The main etiology of rectovaginal fistulas is obstetric trauma with an occurrence of 0.1-0.5% after all vaginal deliveries. These fistulas generally occur low in the rectovaginal septum through the anal sphincters. Another etiology of rectovaginal fistulas is Crohn's Disease; these fistulas can be variable in their presentation and location. There are several methods with which to repair a rectovaginal fistula with no one procedure having better efficacy than another. The success of the repair depends on many factors specific to the patient and fistula tract. We recently encountered a complex 36-year-old female with a history of poorly controlled Crohn's Disease, possible terminal ileum involvement, who had sustained a large rectovaginal

fistula after a traumatic vaginal delivery resulting in a grade 4 perineal laceration. This was immediately repaired, however 2 days after delivery, she noted copious amounts of stool draining from her vagina. This subsequently greatly decreased her quality of life. Additionally, the patient was found to have a patulous anus. After multiple discussions between colorectal surgery, gynecologic surgery and gastroenterology, the decision was made to proceed with a repair of the fistula along with creation of a laparoscopic diverting loop ileostomy and possible small bowel resection. Our video demonstrates her transperineal repair with sphincteroplasty detailing the key steps in such a repair.

Methods/Interventions: Transperineal repair with sphincteroplasty and diverting loop ileostomy creation

Results/Outcome(s): Well healed rectovaginal repair with no evidence of recurrence.

Conclusions/Discussion: The transperineal rectovaginal fistula repair with sphincteroplasty is an appropriate repair for patients who sustain a fistula after a traumatic vaginal delivery. While the dissection of the rectovaginal septum around the fistula and the sphincter muscles can be difficult given the degree of scar tissue from the initial trauma, it can be done successfully with careful sharp dissection and knowledge of the pelvic floor anatomy. Additionally, for our particular patient, the diverting loop ileostomy allowed the repair to heal and the start of immunologic therapy for her Crohn's disease to hopefully prevent any future fistula from occurring.

TRANSANAL ENDOSCOPIC MANAGEMENT OF AN EXTRASPHINCTERIC FISTULA.

VR9

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Purpose/Background: Controversy and few options exist for management of extrasphincteric fistulas in the rectum - due to distance from the anal verge. Curettage, excision of the external fistula tract, primary closure of the internal opening, or an endorectal advancement flap are described, however, only with varying success.

Methods/Interventions: This video demonstrates the use of a transanal endoscopic endorectal advancement flap for management of an extrasphincteric fistula with internal opening in the rectum.

Results/Outcome(s): 6-week post-operative follow-up demonstrates no clinical evidence of fistula recurrence.

Conclusions/Discussion: A transanal endoscopic endorectal advancement flap can be considered in the management of extrasphincteric fistulas with internal opening in the rectum.

THE NICE PROCEDURE ROBOTIC RESECTION FOR DIVERTICULITIS UTILIZING NATURAL ORIFICE INTRACORPOREAL ANASTOMOSIS WITH EXTRACTION.

VR10

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Houston, TX

Purpose/Background: Minimally invasive techniques using natural orifice approaches in colorectal surgery were first reported over 20 years ago. This included left sided colorectal resection for diverticulitis with extraction of the specimen through the rectum and completion of a total ICA anastomosis. Despite many proven benefits, this technique has become nearly obsolete due to the technical limitations and challenges of laparoscopic surgery. With newer technologies such as the robotic Xi platform, there has been a resurgence in enthusiasm for ICA and natural orifice approaches. We developed a stepwise approach for the successful completion of Natural orifice IntraCorporeal anastomosis with Extraction (The NICE procedure) for diverticulitis.

Methods/Interventions: Over a six-month period, we have performed 41 consecutive procedures using the NICE technique displayed in this video presentation. All patients underwent informed consent discussing the salient features of this approach and were entered into an IRB approved database. Patients authorized video recording and dissemination for education, research, social media and all other utilization.

Results/Outcome(s): The NICE procedure was successfully completed in 41 consecutive patients. The steps of the procedure are presented. The mean age was 58, mean BMI was 29 kg/m², the length of procedure was 202 minutes. Post-operative outcomes include mean time to first flatus at 23 hours and mean length of stay was 2.4 days. There were 2 complications consisting of one patient who developed a post-op ileus and one patient who had C. difficile colitis. No patient had anastomotic leak, pelvic abscess or need for re-operative intervention. There was one readmission.

Conclusions/Discussion: We have developed a robotic stepwise approach for surgical resection for diverticulitis using Natural orifice IntraCorporeal anastomosis with Extraction of specimen - The NICE procedure. The procedure can be successfully accomplished without the need for an abdominal extraction incision therefore eliminating associated pain, infection and potential hernias.

SINGLE INCISION LAPAROSCOPIC TECHNIQUE OF SUPERIOR MESENTERIC ARTERY (SMA) MOBILIZATION FOR TENSION FREE POUCH ANASTOMOSIS.

VR20

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Purpose/Background: Lengthening of the mesentery by careful division may be necessary to perform a successful ileal pouch-anal anastomosis without tension. A single incision laparoscopic surgical (SILS) approach for tension-free pouch anal anastomosis has not been widely described.

Methods/Interventions: The patient is a 21 year old female with medically refractory ulcerative colitis who previously underwent subtotal colectomy with end ileostomy. Completion proctectomy with ileoanal J-pouch anastomosis and diverting loop ileostomy was performed 6 months after initial surgery by the single incision laparoscopic technique. Following informed consent, the patient was brought to the OR and IV induction followed by endotracheal intubation was performed. The patient was placed in modified lithotomy. A circumferential incision was performed around the end ileostomy site to mobilize it and return it to the abdomen. A single port gel-point device was introduced into the abdomen through the previous end-ileostomy site to perform the procedure. The rectum was identified and staying posterior all the way, total mesorectal excision was performed. To improve pelvic accessibility and protect the uterus, it was retracted anteriorly. There was mild entry into the posterior vaginal wall on the left side which was promptly repaired laparoscopically by 3-0 vicryls in a figure-of-eight fashion. The repaired vaginal wall was assessed for integrity by digital examination. Following dissection, the rectum was stapled off using GIA-60. A challenging part of single incision laparoscopic surgery is switching orientation from the pelvis to the upper abdomen while preserving exposure and effective instrument handling. The superior mesenteric artery (SMA), which is the main vascular pedicle of the ileal pouch, was identified carefully, following which it was mobilized to extend ileal reach for ileoanal anastomosis. Mobilization of the SMA was performed to enable the apex of the pouch to reach the pubic symphysis for a tension-free pouch-anal anastomosis. The SMA was mobilized all the way down to the pancreas and the retroperitoneal attachments of the ileum are taken down to free it. A J-pouch was created by side-to-side anastomosis using 2 fires of ILA-100. The tip of the created J-pouch was stapled off using DA-30 and oversown. A leak test was performed before the J-pouch was introduced into the abdomen. EEA-31 was used for pouch-anal anastomosis following which pouchoscopy was performed to confirm negative anastomotic leaks. A loop of bowel 40 cm proximal to the pouch was brought to the skin and a stoma was matured in place.

Results/Outcome(s): Final pathology of the resected rectal specimen showed ulcerative colitis. Mobilization of the SMA extended ileal reach by approximately 5cm. Total case time was 190 minutes and the patient experienced no immediate or post-procedural complications and was discharged on post-operative day 4 without any complications.

Conclusions/Discussion: The single incision laparoscopic technique is safe and feasible for effective mobilization of the SMA for tension-free ileal pouch anal anastomosis. Compared to conventional laparoscopy, single incision laparoscopic surgery requires a higher skillset and experience. The technique lowers port-site related complications and incisional hernias, and has the potential of improved cosmesis, postoperative pain, recovery time, and quality of life.

UNDERSTANDING THE ANATOMY OF SPLENIC FLEXURE; INFERIOR/MEDIAL APPROACH; LAPAROSCOPIC LEFT COLECTOMY FOR INTUSSUSCEPTING TUMOR.

VR25

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Purpose/Background: Splenic flexure anatomy is frequently misunderstood due to lack of awareness of true tissue planes. Anatomic misnomers contribute to this confusion. Full understanding of the anatomy of the splenic flexure can be obtained using an inferior-medial approach during laparoscopic left colectomy. Furthermore, following oncologic principles for this operation makes delineation of the true tissue planes even more imperative.

Methods/Interventions: We present a 65 year old male patient with an intussuscepting tumor of the splenic flexure. A formal laparoscopic left colectomy is planned. We describe the technique of the inferior to medial approach and fully delineate the anatomical structure of the splenic flexure and its attachments.

Results/Outcome(s): Good views of the omental leaflets were obtained showing the true nature of the anatomy in this area. The tumor was removed with adjacent omentum to obtain R0 oncologic resection.

Conclusions/Discussion: Splenic flexure anatomy can be easily misunderstood due to perpetuation of misleading anatomic terminology and confusion over tissue planes. When full understanding of the tissue planes is obtained, cleaner and more oncologically sound dissection can be performed.

INTRAOPERATIVE NEAR INFRARED FLUORESCENCE IMAGING FOR ROBOTIC COMPLETE MESOCOLIC EXCISION AND CENTRAL VASCULAR EXCISION FOR RIGHT-SIDED COLON CANCER.

VR26

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Purpose/Background: Recently, intraoperative near infrared fluorescence (INIF) imaging system was incorporated into the Da Vinci Si robotic system and allowed surgeons to identify intravascular near infrared fluorescence signals in real time. We present a video presentation of robotic complete mesocolic excision and central vascular ligation using near infrared fluorescence imaging for right-sided colon cancer.

Methods/Interventions: A 61-year-old woman was referred to our department for treatment of a cecal cancer. Colonoscopy revealed a 5-cm, ulcerofungating mass at cecum. An abdominal computed tomography revealed a cecal mass with enlarged lymph nodes in pericolic and ileocolic area. The patient underwent robotic complete mesocolic excision and central vascular ligation with intracorporeal anastomosis. Indocyanine green was injected submucosally at the beginning of the operation and was injected intravenously immediately prior to INIF imaging to identify the vessels around the central vascular trunk.

Results/Outcome(s): Total procedure time was 350 minutes. The lymphatic ducts and lymph nodes were clearly visualized in real time, and this proved useful in choosing the extent of lymph node dissection. Additionally, near infrared fluorescence imaging allowed the surgeon to identify the colic branches of the superior mesenteric vessels near the central vascular trunk and this imaging demarcated the ischemic zone in the transverse colon and distal ileum during intracorporeal anastomosis, which helped the surgeon to define the each resection margins. Pathologic examination of the specimen showed a 2.2-cm × 2.1-cm mass of moderately differentiated T4aN1bM0 adenocarcinoma cells. The numbers of total and positive lymph nodes harvested were 2 and 29, respectively. The proximal and distal resection margins were 9.2 and 29.3-cm, respectively. The patient was discharged on postoperative day eight.

Conclusions/Discussion: Robotic complete mesocolic excision and central vascular ligation using near infrared fluorescence imaging system for right-sided colon cancer could be performed safely and feasibly. This technique can allow precise lymph node dissection along the central vascular trunk and can facilitate the identification of the origin of the colonic branches of the superior mesenteric vessels.

LOCAL EXCISION OF AN ADENOCARCINOMA OF THE ANAL MARGIN AND RECONSTRUCTION BY BILATERAL V-Y FLAP.

VR27

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Purpose/Background: We present a case of a local excision of a mucinous adenocarcinoma of the anal margin and reconstruction by bilateral V-Yflap.

Methods/Interventions: A 75 y.o female patient presented for a 12 months history of perianal itching and bleeding. His past medical history included hypothyroidism, glaucoma, and hemorrhoidectomy 30 years previously. Physical examination showed a 5 cm plaque-like lesion, involving circumferentially the perianal skin and extending to the anal verge. Biopsy of the perianal mass demonstrated a well-differentiated mucinous adenocarcinoma. A pelvis MRI showed that the lesion merely invaded the skin tissue without involvement of perirectal structures and anal sphincters. A colonoscopy showed two polyps in the ascending colon which were removed and were both TV adenomas with low-grade dysplasia. A total-body CT scan did not show any associated visceral malignancy nor lymphadenopathy. A wide local excision was planned with a flap to close the perianal defect and a protective colostomy. A lymphoscintigraphy was performed which showed uptake in the right inguinal region. The patient underwent surgery under general anesthesia. A sentinel inguinal lymph node was retrieved and a laparoscopic colostomy was performed. The patient was then placed in jack-knife position. The neoplasia was resected with 1 cm of free margins. The defect is then covered with a bilateral V-Y skin flap in conjunction with the plastic surgeon. The pathological report was: mucinous adenocarcinoma of the perianal skin involving the subcutaneous tissue with Paget's disease towards the resection margins. The inguinal sentinel node was negative.

Results/Outcome(s): The postoperative course was uneventful and the patient was discharged on postoperative day 6. After 3 months random biopsies were taken in the perilesional area and histopathological examination showed no sign of disease. The colostomy was closed 2 months later and the patient is now well 9 months after surgery.

Conclusions/Discussion: Mucinous adenocarcinoma of the perianal skin is an extremely rare disease. It usually arises after long-lasting untreated Paget's disease. The treatment often requires an APR excision, however, in the absence of regional nodes involvement, a wide local excision can be carried out. Large resections may require various flaps to close the surgical defect and may need the assistance of a plastic surgeon

ROBOTIC PARTIAL EXCISION OF LEVATOR-ANI MUSCLE FOR LOCALLY ADVANCED LOW RECTAL CANCER INVADING IPSILATERAL PELVIC FLOOR.

VR28

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Purpose/Background: Tumors at the level of the anorectal junction had required abdominoperineal resection with a permanent colostomy to achieve an adequate resection margin. However, in the cases of tumor invading ipsilateral levator-ani muscle and intact external sphincter, en bloc resection of the rectum with levator-ani muscle including tumor would be possible. The partial excision of levator-ani muscle (PELM) technique enables preserving the anal sphincter function with obtaining oncologic clearance and avoiding permanent colostomy in those patients. The purpose of this video is to show the critical anatomic steps of this procedure.

Methods/Interventions: A video was produced from the robotic intersphincteric resection with right PELM procedure performed in a 57-year-old female patient with low rectal cancer at 3 cm from the anal verge, invading the anorectal ring, who had received neoadjuvant chemoradiotherapy (nCRT). After re-staging the patient with an MRI, the surgery was scheduled at 8 weeks after nCRT completion. The same team was involved in both approaches of the procedure: abdominal and perineal. The abdominal portion of the operation was performed by robotic, and after a complete total mesorectal excision (TME) was performed, the patient underwent the perineal phase.

Results/Outcome(s): The patient resumed a soft diet at POD #4 without any problems and discharged at POD #8 without any complication. The pathology of the surgical specimen revealed perirectal fat tissue invasion with 2 regional lymph node metastases (ypT3N1bM0). Neither lymphovascular invasion nor perineural invasion were found. The secure resection margin from the tumor was achieved, especially the circumferential resection margin, which was the primary intention of PELM.

Conclusions/Discussion: PELM is a novel sphincter-preserving technique that can be a treatment option for low rectal cancer invading ipsilateral levator-ani muscle, which has been an indication for abdominoperineal resection (APR) or extralevator APR.

LAPAROSCOPIC RADICAL RECTOSIGMOID CANCER RESECTION WITH LEFT LATERAL PELVIC LYMPH NODES DISSECTION IN A EN-BLOC RESECTION MANNER.

VR29

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Purpose/Background: Therapeutic lateral pelvic lymph nodes dissection was widely performed for advanced rectal cancer with metastatic lateral pelvic lymph node in East Asia. Herein we introduce laparoscopic lateral pelvic lymph nodes dissection in a en-bloc resection manner.

Methods/Interventions: This was a patient diagnosed with advanced rectosigmoid adenocarcinoma and was identified with enlarged lateral pelvic lymph node by computed tomography and magnetic resonance examination. The clinical TNM stage was T3N2M0 (with left lateral pelvic lymph nodes metastasis) according to the AJCC 8th Edition Cancer Staging. After discussed by multidisciplinary team, the patient received 3 course of neoadjuvant Capelox chemotherapy. The therapy effect was evaluated 2 month later and was partial response according to the new response evaluation criteria in solid tumors (Revised Recist guideline version 1.1). Finally, the patient underwent laparoscopic radical rectosigmoid cancer resection with left lateral pelvic lymph nodes dissection in a en-bloc resection manner.

Results/Outcome(s): The operative time was 275 minutes. The blood loss was 100 ml. No postoperative complication was recorded. The time of first flatus was 3 days. The postoperative hospital stay was 7 days. The number of lymph nodes harvested was 34. The number of lateral pelvic lymph node was 4, in which one was positive.

Conclusions/Discussion: Laparoscopic radical rectosigmoid cancer resection with lateral pelvic lymph nodes dissection in a en-bloc resection manner was safe and feasible.

LAPAROSCOPIC RIGHT HEMICOLECTOMY WITH COMPLETE MESOCOLIC EXCISION.

VR30

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Purpose/Background: Complete mesocolic excision is a standardised approach to radical colectomy. This technique involves three essential components viz. dissection in the mesocolic plane to achieve an intact mesocolic envelop, ligation of the draining vascular pedicles at their root and resection of at least 10cm of bowel at each end of the tumour to excise all involved pericolic nodes. A superior disease free survival has been reported with this technique though in some reports, at the cost of an increased post-operative morbidity. This video demonstrates the

surgical technique for laparoscopic right hemicolectomy with complete mesocolic excision.

Methods/Interventions: Not Applicable

Results/Outcome(s): Not Applicable

Conclusions/Discussion: Not Applicable.

TRANSVAGINAL RECTOCELE AUGMENTED REPAIR WITH MESH AND LEVATORPLASTY.

VR38

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Purpose/Background: Rectoceles are outpouchings of the rectal wall anteriorly into the vaginal canal. They often involve a weakness of the rectovaginal septum and can present with a variety of symptoms including obstructive defecation. When symptoms do occur, they often have a significant impact on the quality of life of a patient. While conservative measures are often recommended for initial treatment, surgical repair may be indicated in patients who fail medical management. There are several approaches to rectocele repair including transvaginal, transanal, transperineal and transabdominal. The advent of biologic mesh has also provided an adjunct to rectocele repair. Here we present the case of a transvaginal rectocele repair with implantation of biologic mesh and levatorplasty.

Methods/Interventions: After placing the patient in the dorsal lithotomy position, digital rectal exam confirms the rectocele. A Lone Star retractor is used to further expose the vaginal canal. Then a marking pen is used to outline the vaginal flap. Bovie electrocautery is used to score the vaginal mucosa. A full thickness flap is raised starting at the introitus, separating the vaginal fibromuscular layer off of the epithelium. A plane is developed in the rectovaginal septum using a combination of electrocautery and sharp dissection. The dissection is carried 2 cm proximal to the rectocele. The attenuated rectovaginal septum is then plicated using 2-0 vicryl sutures. A biologic mesh is then anchored to the most proximal portion of our dissection plane using 2-0 vicryl sutures. The mesh is then fashioned to an appropriate size. Once the mesh is anchored into place, a levatorplasty is completed using absorbable suture to re-enforce our repair. The vaginal flap is then re-approximated using interrupted 2-0 vicryl sutures. The redundant portion of the flap is excised to allow for adequate approximation. A penrose drain is placed below the flap and sutured into place to prevent hematoma formation. The flap is then fully approximated with additional interrupted absorbable sutures.

Results/Outcome(s): The patient's hospital course was uneventful. On post-operative day 1, the penrose drain was removed and the patient was discharged home. Subsequent outpatient follow up showed a well-healed flap with complete resolution of her prior symptoms. Physical exam showed no signs of a recurrent rectocele.

Conclusions/Discussion: Symptomatic rectoceles can significantly impact a patient's quality of life. When conservative measures fail, surgical repair may be the best option for the patient. In this case, we present the successful transvaginal rectocele repair with implantation of biologic mesh and levatorplasty.

FULL THICKNESS RECTAL PROLAPSE: DELORME PROCEDURE REMAINS AN OPTION.

VR39

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Purpose/Background: Full thickness rectal prolapse or procidentia is a circumferential, full-thickness intussusception of the rectal wall. Surgery is the only curative treatment for full thickness rectal prolapse. The choice of optimal surgical procedure should be patient specific and is therefore multifactorial and at times controversial. Initially described in 1900 by French military surgeon, Edmond Delorme, the Delorme procedure has an excellent risk profile and is therefore a good option for high risk patients in whom an abdominal approach is prohibitive. Other benefits of a Delorme rectopexy include a short operating time, a low cost profile, particularly compared to robotic ventral procedures, and minimal risk of neurovascular injury, however the advantages of this need to be balanced with a higher reported recurrence rate (15-30% in large series).

Methods/Interventions: This video recording demonstrates full thickness rectal prolapse documented in an outpatient setting followed by a detailed commentary of the repair performed in Kraske position under general anesthesia. This recording was approved by the institutional review board and the patient was appropriately consented prior to surgery.

Results/Outcome(s): This four minute video demonstrates the Delorme procedure. In our institution the procedure takes an average of forty minutes. The patient is typically admitted overnight for observation. Following a successful trial of void, the patient is discharged the next morning and is reviewed in clinic 4-6 weeks following.

Conclusions/Discussion: If the diagnosis of rectal prolapse is suspected, but cannot be readily reproduced; we evaluate the patient standing, squatting or straining on the commode. If such maneuvers fail to reproduce the prolapse, the patient can be asked to photograph the prolapse at home. We do not offer rectal prolapse repair without documented full thickness prolapse. The Delorme rectopexy is an excellent option in the armamentarium of the colorectal surgeon and is appropriate for high risk, comorbid patients.

MODIFIED KARYDAKIS SURGERY OF PILONIDAL SINUS.

VR11

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Purpose/Background: Pilo sinus is a subcutaneous infection that occurs mostly in the buttocks and sacrococcygeal region. The main way to treat pilus sinuses is surgery. For patients with complex or multiple recurrences of chronic pilonidal sinus, flap technique can be used to remove the lesion. At present, the main flap techniques reported in the medical literature are the Limberg flap and the modified operation, Bascom buttock groove elevation and Karydakislflap. The clinical effects of the three kinds of flaps in the treatment of pilonidal sinus are comparable, but from personal experience, Karydakisl flap technique is easier to master, and the postoperative complications of patients with less damage.

Methods/Interventions: Discuss about some main technical points of modified Karydakisl flap operation.

Results/Outcome(s): 1. Designing incision: According to the location of the lesion, make an elliptic incision at least 1cm near the middle line, obliquely complete excision of the lesion skin, lesion tissue and the skin fovea at the middle line to the sacral fascia. 2. Fully free flaps near the median line: The free area should be tension-free when the incision is closed, and sufficient hemostasis when free. 3. Move the flap to the opposite side and to the middle suture: Suture can be interrupted stratified suture, suture do not remain dead space. 4. Place the negative pressure drainage balls at the lowest part of the wound: According to the shape of the wound, the negative pressure drainage balls are placed near the lowest part of the sacrococcyx, which can fully drain the oozing fluid from the wound and reduce the incidence of infection and incision rupture.

Conclusions/Discussion: The main technical points of modified Karydakisl flap operation are summarized as follows: to avoid excessive incision tension, elevate the gluteal groove and prevent the invasion of hair to reduce recurrence by transferring the flap and suturing it in the middle line.



EXTRAPERITONEAL COLOSTOMY: AN OPTION FOR REPAIR OF PARASTOMAL HERNIA AND STOMA PROLAPSE.

VR12

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Purpose/Background: The extraperitoneal colostomy technique was first described in separate reports by Goligher and Sames in 1958 for colostomy creation at the time of abdominoperineal resection. In multiple case series and studies, extraperitoneal colostomy creation is associated with a lower rate of parastomal hernia and stoma prolapse when compared to the traditional transperitoneal approach. The technique can be used either for de novo creation of a stoma, or for repair of a parastomal hernia and/or stoma prolapse. This video demonstrates the technique for creation of an extraperitoneal colostomy.

Methods/Interventions: We filmed and edited video footage that was acquired during surgery to repair a parastomal hernia and a stoma prolapse.

Results/Outcome(s): The parastomal hernia and prolapse was successfully repaired during the surgery. The patient was seen at the 2-year follow up point and had no evidence of parastomal hernia nor prolapse on exam or on CT imaging.

Conclusions/Discussion: Extraperitoneal colostomy creation is a viable option for repair of a parastomal hernia and stoma prolapse. Given the outcomes noted in prior studies, this technique should be considered as an option for de novo creation of a colostomy, as well as, for surgical management of parastomal hernia and prolapse.

A GOOD METHOD FOR GIANT RECTAL POLYP TREATMENT: TAMIS.

VR31

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Purpose/Background: Polyps are frequently detected in the colon or rectum of the patients because of the widespread use of colonoscopy and rectosigmoidoscopy. Most of the polyps can be managed by endoscopically. However some polyps cannot be removed endoscopically and require surgery. Giant rectal polyps are suitable for local excision and transanal micro invasive surgery (TAMIS) is a good choice for treatment.

Methods/Interventions: Thirty-eight years old female patient had a circumferential polyp which involved approximately one half of the rectal mucosa between 8th and 12th cms. During rectoscopy a punch biopsy was performed. The polyp was a tubulovillous adenoma with focal carcinoma in situ. In the MR images, it did not reach the submucosa. So we recommended Transanal microinvasive surgery to the patient and she accepted. We did the operation in

lithotomy position under the general anesthesia. We used standard SILS port for the access. The large polyp was removed by cautery and harmonic energy device. Then the large defect was repaired with V-loc suture.

Results/Outcome(s): In the Postoperative first day, oral intake was started. Flatus and fecal discharge were occurred in postoperative second day. The patient was discharged from hospital on the third day. The patient has been followed in 6 months periods since surgery. Twelve months after surgery there is no complication or recurrence.

Conclusions/Discussion: TAMIS is a safe and reliable method for rectal lesions.

LOW ANTERIOR RESECTION WITH EXCISION OF SEMINAL VESICLE AND VAS DEFERENS.

VR32

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Purpose/Background: 57 year old male with T3N0M0 high rectal cancer with close proximity to the seminal vesicle presented for low anterior resection after neoadjuvant therapy.

Methods/Interventions: A combined laparoscopic and robotic approach to low anterior resection was utilized. Due to the proximity of the tumor to the seminal vesicle and vas deferens, these structures were resected en bloc with the rectum.

Results/Outcome(s): On pathologic analysis, the closest margin was found to be 1 mm at the anterior aspect of the mesorectum.

Conclusions/Discussion: This case demonstrates successful en bloc resection of the vas deferens and seminal vesicle when rectal tumor involvement is suspected.

MEMBRANE ORIENTED LAPAROSCOPIC LYMPHADENECTOMY PLUS COMPLETE MENSOCOLIC EXCISION IN LEFT HEMICOLECTOMY.

VR33

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Purpose/Background: Complete mesocolic excision (CME) with central vascular ligation (CVL) has demonstrated to improve the long-term oncological outcomes. However, it remains the most technical challenging and time-consuming procedure because of its anatomical complexity. The authors provide a video to demonstrate laparoscopic left colectomy with CME following an optimal mesentery-defined approach with embryological and anatomical consideration.

Methods/Interventions: The technique consists of four steps. First, the surgeon identifies the "tri-junction" in the sigmoid mesocolon area. This tri-junction is the fusion point of posterior

sheet of descending mesocolon, the visceral peritoneum, and the prerenal fascia. The fusion fascia was incised at the promontory and mobilization was continued along the loose connective tissues. Second, the second "tri-junction" in the lateral peritoneal reflection area was identified. This tri-junction was the fusion point of the posterior sheet of descending mesocolon, the parietal peritoneum, and the prerenal fascia. The lesser sac was entered for the first time. Third, Transverse mesocolon was divided along the inferior pancreatic edge medial to lateral. The pancreatic body and tail was cover by the third sheet of omentum anteriorly and the fusion fascia of the fourth player of omentum and the anterior sheet of transverse mesocolon posteriorly. The lesser sac was entered for the second time. The left branches of MCA/MCV were clipped and cut. Finally, the fusion fascia of the first and second sheet of omentum was divided, and the gastro-colic ligament was cut at the same time. The omental bursa was opened wide for the third time preserving the gastroepiploic arcade. The transverse mesocolon was divided to the inferior pole of the spleen. The removal of the mesocolon with its intact mesocolic envelope completed the mesocolic excision.

Results/Outcome(s): There were 8 males and 7 females with splenic flexure colon cancer underwent laparoscopic left hemicolectomy. There were no conversions to open surgery or serious intraoperative complications. The mean operative time was 181.5 ± 32.6 min, and blood loss were 82.6 ± 41.8 ml. There was no recurrence at a mean follow-up period of 11.2 ± 5.3 months.

Conclusions/Discussion: The mesentery-dfined approach with the knowledge of embryological and anatomical consideration is safe and feasible for treatment of splenic flexure cancer.

STAPLED TRANS-PERINEAL FISTULA REPAIR OF RECTOVAGINAL FISTULA.

VR40

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Purpose/Background: We describe a technique for the management of rectovaginal fistula (RVF), namely stapled trans-perineal fistula repair of rectovaginal fistula. This modified procedure was successfully applied in China and preliminary data showed promising outcomes [1].
Reference: [1] Lin HC, Huang L, Chen HX, Zhou Q, Ren DL. Stapled Transperineal Fistula Repair of Rectovaginal Fistula: A Preliminary Experience. Surg Innov. 2018 Sep 10:1553350618799452. doi: 10.1177/1553350618799452. [Epub ahead of print]

Methods/Interventions: This technique was characterized with a transperineal RVF using the Echelon Flex 60 Endopath stapler. A high quality stapler is able to close the orifice on the rectal side and withstand normal rectal pressures and appears in this preliminary study to be safe and effective even in the recurrent or complex case. In our approach a sphincteroplasty and levatoroplasty was routine.

It is likely that the levatoroplasty and sphincteroplasty contributed to our high initial success rate because it not only augments the rectovaginal septum but also reduces the RVF anastomotic tension. In addition, levatoroplasty and sphincteroplasty can increase the sphincter tone. A brief description of Stapled trans-perineal fistula repair of rectovaginal fistula: Patients are often operated on in the lithotomy position with routine urethral catheterization. A "U-shaped" incision is made in the perineum followed by dissection of the posterior vaginal wall from the anterior rectal wall delineating the rectovaginal septum. Using electric surgical knives, the bloodless dissection of the correct plane is straightforward. To isolate the operative field, a Lone Star Retractor System is usually used. Creating a desired pathway can be cumbersome, time-consuming and require extensive surgical exploration. This process can also cause unintended damage to the rectovaginal fistula tract in the pathway. For this regard, a Nelaton tube is used to insert the tract and the rectovaginal tract will be easily identified and separated by creating a peri-fistular zone of clearance. In addition, a combination of careful blunt and sharp dissection is used to find the specific plane in the rectovaginal septum to dissect the rectovaginal tract in this limited space. When sufficient space was created, the fistula is then closed with the Echelon Flex 60 Endopath stapler employing the blue or golden staple cartridge. After removal of the stapler, the external anal sphincter and the levator ani muscle are readily exposed. At this time, levatoroplasty or sphincteroplasty will be added based upon the surgeon's preference. We believe that an added levatoroplasty and sphincteroplasty enhances the durability of repair against high intra-rectal pressures and may secondarily support anal sphincter function. Finally, suction drainage is usually performed and a vaginal gauze pack is routinely placed for haemostasis.

Results/Outcome(s): Thirty consecutive RVF patients underwent stapled transperineal repair. Over a median follow-up of 5 months (range 3-43 months), no case was encountered with recurrence.

Conclusions/Discussion: Stapled transperineal repair of RVF appear to be a safe and effective technique. These initial results would encourage a more formal prospective assessment of this technique.

EXCISION OF PRESACRAL TUMOR WITH KRASKE APPROACH.

VR13

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Purpose/Background: The case being presented is an excision of a presacral mass via the Kraske approach. The patient is a 35 year old otherwise healthy female presenting initially with dyspareunia, metrorrhagia, and difficulty conceiving. Work up with transvaginal

ultrasound demonstrated a 2.5cm pelvic mass believed to be an endometrioma. A repeat ultrasound 18 months later demonstrated an increase in size to 3.5cm. Imaging with pelvic MRI confirmed a heterogeneous mass in the presacral space, below the S3 nerve root as shown. Given the increase in size and the potential for malignancy in retrorectal tumors, the recommendation was for excision, with a Kraske approach.

Methods/Interventions: The patient was taken to the operating room and placed in prone jackknife position. The sacrum was marked out pre operatively. A left paramedian incision was made. The subcutaneous fat was dissected down along the left lateral aspect of the sacrum until the insertion of the gluteus was identified. The dissection was then taken down along the sacrum to the coccyx. A midline incision was created over the periosteum. Periosteal elevators were utilized to dissect the coccyx. The tip of the coccyx was then grasped with a towel clamp. The coccyx was inverted to an approximately 90 degree angle towards the rectum and was excised in total. The smooth contour of the mass was identified and lateral dissection was started with the bovie cautery. Blunt dissection with hemostats and kitners was also used to free the mass. Circumferential dissection was undertaken, with frequent need to reposition the lesion for visualization. The capsule was inadvertently entered and spillage was controlled. Digital rectal examination was utilized to ensure proper dissection planes and to facilitate complete resection from the posterior aspect of the rectum. After clear margins were obtained circumferentially the mass was removed. The posterior rectum was visualized. The cavity was irrigated, and the defect was closed in multiple layers.

Results/Outcome(s): The patient tolerated the procedure well and had an uneventful recovery. The final pathology demonstrated glandular enteric-type epithelium with areas of squamous metaplasia, consistent with an enteric duplication cyst.

Conclusions/Discussion: This pathology found in the rectum is very rare, with only case reports found in the literature, primarily excised via an anterior approach. This video presents an alternative approach for resection.

ROBOTIC ASSISTED INTRACORPOREAL ANASTOMOSIS FOR LEFT COLECTOMIES.

VR14

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Purpose/Background: Video presentation demonstrating robotic assisted intracorporeal EEA (end-to-end anastomosis) for left-sided colectomies. Procedure is presented as an alternative to a Pfannenstiel or low midline laparotomy for the extracorporeal anastomosis and specimen extraction.

Methods/Interventions: Video presentation highlighting robotic assisted surgical procedure for an intracorporeal EEA anvil placement for left-sided colectomies.

Results/Outcome(s): Robotic assisted intracorporeal EEA demonstration on a low anterior resection with extraction through an off-midline incision. Recent studies demonstrated some advantages of ICA vs. ECA for right colectomies. Similar principles can apply for left-sided colectomies.

Conclusions/Discussion: Robotic assisted intracorporeal anastomosis using an EEA for left colectomies is an alternative to an extracorporeal anastomosis using Pfannenstiel and low midline laparotomy incisions.

MAGNETIC RETRACTION IN COLORECTAL SURGERY.

VR15

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Purpose/Background: Appropriate tissue retraction is essential in laparoscopic colorectal operations. Magnetic retractors have previously been utilized for a number of other minimally invasive procedures. Herein, we detail the use of a magnetic surgical system during laparoscopic suture rectopexy and single incision partial right colectomy.

Methods/Interventions: The magnetic retractor is composed of an internal metallic grasper with a detachable tip that couples with an external magnet controller. The external magnet is positioned using a standard bedrail mounted arm. Due to its small size, it can be easily maneuvered across the abdominal wall. The grasper tip is introduced through an existing 12-mm port at the end of a magnetized instrument and clamped to the desired organ or tissue. The external magnet is then placed over the abdominal wall, coupled to the detached grasper tip, and magnetic attraction allows for manipulation of the grasper tip to retract the desired organ or tissue. Once the procedure is complete, the external magnet is decoupled, and the grasper tip is retrieved from the abdominal cavity using the same introducer instrument. We show the application of the device for suture rectopexy and partial colectomy.

Results/Outcome(s): The patients tolerated the procedures well with no reported complications.

Conclusions/Discussion: The use of magnetic retraction systems provide a safe and feasible dynamic, incision-less option for organ retraction while offering adequate visibility and tension during laparoscopic colorectal procedures.

PELVIC DISSECTION FOR RECTAL CANCER IN THE SETTING OF CONGENITAL PELVIC KIDNEY.

VR16

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Purpose/Background: Laparoscopic high ligation for surgical treatment of colorectal malignancies can be challenging due to aberrant anatomy, specifically location of a kidney in the pelvis.

Methods/Interventions: We present a rare case of robotic-assisted reconstruction abdominoperineal resection for a locally advanced rectal cancer in a patient with a congenital pelvic kidney. The procedure commenced robotically, beginning with the total mesorectal excision, traditionally the last abdominal portion of an abdominoperineal resection. The first step is to enter the mesorectal plane from the right lateral side, just below the sacral promontory. Second, the mesorectal dissection is carried posteriorly, using sharp dissection, as far as the surgeon can proceed. Third the dissection is carried anteriorly and over to the left side. The left lateral dissection is completed up to the sacral promontory and then connected to the posterior plane. Next the mesorectal plane is carried up to the sigmoid mesocolon, separating the pelvic kidney from the sigmoid colon. In our video, the remainder of the procedure is done laparoscopically to allow a separate team to commence the perineal dissection, but this could easily be done robotically. The Inferior Mesenteric Artery (IMA) is then isolated, lifting the sigmoid colon and sweeping the retroperitoneal structures posteriorly. This maneuver exposes the renal artery, ensuring its position away from the structures to be ligated. The IMA is then ligated using hemoclips and electrocautery. The pelvic kidney is then easily exposed along with its hilar vasculature. A post-operative CT scan is included in the video to highlight the precise nature of axial imaging for aberrant vasculature.

Results/Outcome(s): This is a 71-year-old female who underwent radiation for locally advanced rectal cancer that presented with perineal pain and increasing locally invasive mass in the rectum. Patient was presented at the multidisciplinary tumor board and it was decided she would undergo a abdominoperineal resection followed by chemotherapy. Hospital course was uneventful and the patient was discharged home on post-operative day 5. Final pathology revealed a ypT4bN0 tumor with a lymph node yield of 15.

Conclusions/Discussion: Rare anatomical variations, such as a congenital pelvic kidney, can present challenging anatomy for minimally invasive surgeons. Proper mesocolic and mesorectal excisions are standard of care for cancer patients, and should not be compromised due to surgical technique or anatomic aberrations. Preoperative imaging can give the surgeon a precise road map to the anatomy. Clearly documenting anatomy and surgical steps

in a reproducible format, such as video, can help disseminate safe surgical techniques for rare anomalies to larger audiences.

THE MODERN S-POUCH: “NO OUTLET” DESIGN.

VR21

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Purpose/Background: Parks’ original Ileal-S-pouch construct included a significant outlet-spout and hand-sewn anastomosis. Although this configuration allows for improved stool frequency, an increased need for intubation and greater technical requirement has seen this design less favored by most colorectal surgeons. However, simple modifications to the S-pouch construction have modernized this design and allow for improvement in pouch function.

Methods/Interventions: This video demonstrates Ileal-S-pouch construction after procto-colectomy in a young female with long standing ulcerative colitis. The hand-sewn triplicate, S-pouch design is shown with a “no outlet” technique to minimize emptying difficulties, and includes a double-stapled anastomosis without mucosectomy.

Results/Outcome(s): More distal incision of the first bowel “limb” and mesenteric-ward incision of the second “limb” allows for enhanced length at the pouch outlet and avoidance of a significant spout. This alteration coupled with anvil placement and a double stapled approach minimize the “S” outlet. The entire S-pouch construction is shown.

Conclusions/Discussion: Technical alterations during S-Pouch construction and double stapled anastomosis can allow for a more modern “no outlet” design thus maintaining improved stool frequency while avoiding previously noted evacuation difficulties.

LAPAROSCOPIC RIGHT HEMICOLECTOMY WITH D3 LYMPH NODE DISSECTION: A NATURAL ORIFICE SPECIMEN EXTRACTION SURGERY (NOSES).

VR34

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Purpose/Background: Laparoscopic right hemicolectomy involves making an additional incision to remove the specimen and perform the anastomosis. Recently, natural orifice specimen extraction surgery (NOSES) has been reported as an alternative approach without any additional incisions or extensions, may lead to better outcomes compared to conventional laparoscopic right hemicolectomy.

Methods/Interventions: We describe the technique with transvaginal specimen extraction and D3 lymph node

dissection in laparoscopic right hemicolectomy by this video. The patient is placed in a slight Trendelenburg position. The medial-to-lateral dissection begins with identification of the ileocolic vascular pedicle. The terminal ileum and right hemicolon were resected. We performed intracorporeal anastomosis combined with a transvaginal route of specimen extraction after medial-to-lateral mobilization.

Results/Outcome(s): The operation time was 230 min and the hospital stay was 6 days. An excellent postoperative recovery was demonstrated and has shown future potential for less incision. The pathologic TNM stage is T3N0M0.

Conclusions/Discussion: This procedure could be a well-established strategy and may be considered as an alternative procedure to the conventional laparoscopic right hemicolectomy. The long-term benefits of this procedure need to be more evaluated.

LAPAROSCOPIC RIGHT HEMICOLECTOMY WITH CME: A CAUDAL-TO-CRANIAL APPROACH GUIDED BY THE DUODENUM.

VR35

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Purpose/Background: In 2016, we first describe a caudal-to-cranial approach for laparoscopic right hemicolectomy. This approach was a safe alternative to the conventional medial-to-lateral approach, especially for inexperienced surgeons. As we all know, the duodenum is an organ passing through the retroperitoneum. Thus, we report a caudal-to-cranial approach guided by the duodenum for laparoscopic right hemicolectomy.

Methods/Interventions: Step 1 Right Toldt’s space dissection The “membranous bridge” between the mesentery and retroperitoneum was cut guided by the duodenum. The right Toldt’s fascia and the pancreatic duodenal anterior space are dissected with the pancreas and the posterior paries of superior mesenteric vein (SMV) exposed. **Step 2 Central vascular ligation** The mesocolon between the ileocolic vessels (ICVs) and SMV is dissected and the peritoneum on the surface of SMV is cut. The whole SMV is exposed. Then the ICVs, right colic vessels (RCVs), Henle’s trunk and the middle colic vessels (MCVs) are exposed. In this patient, the MCVs are defect. A central vascular ligation is performed to achieve CME. **Step 3 Cranial and lateral mobilization** The gastrocolic omentum is dissected for full mobilization of the mesocolon containing 10 cm of normal colon distal to the lesion. And the lateral attachments of the ascending colon is also separated.

Results/Outcome(s): From January 2018 to September 2018, 17 patients with right side colon cancer underwent laparoscopic right hemicolectomy with CME using a caudal-to-cranial approach guided by the duodenum. The

median operative time was 160 (115 to 210) min with a median estimated blood loss of 30 (10 to 100) ml. The median time of first flatus was 3 (1 to 5) days. The postoperative hospital stay was 6 (4 to 9) days. The median number of lymph nodes harvested was 34 (17 to 55). One patient (1/17, 5.9%) occurred postoperative anastomotic bleeding and was cured with endoscopic measure.

Conclusions/Discussion: Laparoscopic right hemicolectomy with CME using a caudal-to-cranial approach guided the duodenum is safe and feasible, but further studies are needed.

MULTI QUADRANT ROBOTIC RESECTION OF A T4 SIGMOID TUMOR, IN THE OBESE PATIENT.

VR36

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Purpose/Background: Minimal invasive surgery is the standard approach for CRC-surgery in Denmark, performing > 80 % of all resections with that approach. The percentage has only been rising the last 10-15 years. The cases where we often choose the “open” access are the advanced tumors with intimate relation to adjacent organs. The purpose of this video is to show, that using robotic technology with the advantages of endowrist functions and high definition resolution 3D vision, we find it safe and feasible to perform T4 surgery in a minimally invasive way in regards of surgical and oncological outcomes.

Methods/Interventions: Four robotic trocars was placed on a semicurved line in the right hemiabdomen and one additional robot trocar in the left iliac fossa. The assistant

trocar was placed in the upper right quadrant. Standard medial to lateral approach dividing the IMV, mobilizing the splenic flexure by entering the lesser sac from below. Then dividing the IMA at its origin. Redocking and tilting the patient in Trendelenburg switching arm 4 to the left side of the robot. Then resecting 20 cm of the ileum “en bloc” with the tumor. Next mobilizing the sigmoid, still using medial to lateral approach. Finally, we attended the relation to the urinary bladder. The tumor was resected in safe distance without entering the bladder. The specimen was extracted through a Pfannenstiels incision and an end-to-end anastomosis was performed. The ileo-coecal region was mobilized for extracorporeal hand-sewn small bowel anastomosis. Operating time: 5 h, bleeding: 300 cc

Results/Outcome(s): 72 year old male, BMI = 33, no prior surgery, hypertension and NIDDM. Colonoscopy shows large stricturing tumor in the sigmoid. CT-scan showed close relation of the tumor to the urinary bladder and the small bowel. During the operation, we had confirmation of the adherence/invasion into the bladder peritoneum and the small bowel. The patient had an uneventful recovery and was discharged on POD 4, without readmission. Bowel function on POD 2. Histology showed pT4N2 tumor with direct invasion to the bladder peritoneum and the small bowel. R0 resection in mesocolic plane. The patient was referred for adjuvant oncological treatment.

Conclusions/Discussion: Redocking and dynamic use of the 4th arm, facilitate a technical and oncological safe multiquadrant surgery without conversion.