

# The American Society of Colon and Rectal Surgeons

## Annual Meeting Abstracts

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Seattle, WA

## GENERAL SURGERY RESIDENTS' FORUM

### IS NEUTROPHIL LYMPHOCYTE RATIO ASSOCIATED WITH INCREASED MORBIDITY AFTER COLORECTAL SURGERY?

GS1

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**Purpose/Background:** In the current study, we aimed to evaluate the association between pre- and postoperative neutrophil lymphocyte ratio (NLR) and 30-day postoperative complications after colorectal surgery and determine, if any trends in NLR predicts complications.

**Methods/Interventions:** Patients who underwent elective colorectal surgery between January 2010 and

December 2014 were identified from our prospectively maintained database. Patients who had preoperative as well as postoperative first and second day NLR (abstracted from CBC) were included in the study. Patients received neoadjuvant chemoradiation, on steroids, had anorectal and emergency surgeries were excluded. Patients were divided into two groups based on the presence of postoperative complications. Demographics, preoperative comorbidities, operative details and postoperative 30-day morbidity and mortality were reviewed and compared.

**Results/Outcome(s):** A total of 1328 patients met the inclusion criteria during the study period with a mean age of 61 ±16 years. 518 (39%) patients experienced at least one postoperative morbidity. Table summarizes the comparative analysis for demographics and preoperative comorbidities.

**GS1 Comparison of perioperative characteristics and postoperative outcomes between the groups**

Variable	Morbidity (+) (N=518)	Morbidity (-) (N=810)	P value
Age¥, years	62.0 ± 17.2	60.9 ± 16.2	0.24
Gender			<0.001
Female	226(34.1)	437 (65.9)	
Male	292 (43.9)	373 (56.1)	
BMI ¥ (kg/m2)	27.9 ± 7.0	27.2 ± 7.2	0.07
Surgical procedures			
Right colectomy w ICA	215 (41.0)	310 (59.0)	
Left colectomy w CCA	145 (33.6)	286 (66.4)	
LAR w CRA	93 (41.0)	134 (59.0)	
Total colectomy w IRA	65 (44.8)	80(55.2)	
Diabetes Mellitus	78 (54.9)	64 (45.1)	<0.001
Surgical approach			<0.001
Minimal invasive approach	274 (34.6)	517 (65.4)	
Open	244 (45.4)	293 (54.6)	
Pre op NLR	9.9 ± 12.8	10.2 ± 13.5	0.66
NLR on POD1	16.6 ± 20.2	13.8 ± 13.8	0.028
NLR on POD2	9.9 ± 12.9	8.0 ± 8.9	0.016
Length of hospital stay¥, days	11.4 ± 7.9	6.4 ± 4.1	<0.001
ASA score			0.15
1/2	161 (36.4)	281 (63.6)	
3/4	332 (40.6)	486 (59.4)	
Diagnosis			0.001
Cancer	245 (41.5)	346 (58.5)	
Diverticulosis	102 (32.2)	215 (67.8)	
Crohn's Disease	98 (46.4)	113 (53.6)	
Polyposis syndromes	31 (27.4)	82 (72.6)	
Ulcerative colitis	25 (49.0)	26 (51.0)	
Constipation	17 (37.8)	28 (62.2)	
Operative time¥, minutes	207 ± 100	190 ± 81	0.001

Values are expressed as absolute numbers (percentages) unless indicated otherwise; ¥ values are expressed as mean (Standard Deviation). ICA: ileocolic anastomosis; CCA: colo-colonic anastomosis; LAR w CRA: low anterior resection and colorectal anastomosis; IRA: ileorectal anastomosis; EBL: estimated blood loss; NLR: neutrophil lymphocyte ratio; WBCs: white blood cells.

Gender ( $p < 0.001$ ), diabetes mellitus ( $p < 0.001$ ), type of specific diagnosis ( $p = 0.001$ ), type of operation ( $p = 0.03$ ) and open surgery ( $p < 0.001$ ), NLR on POD-1 ( $p = 0.02$ ) and POD-2 ( $p = 0.01$ ) were statistically different between the groups. Patients who had postoperative morbidity were found to have longer operative time ( $207 \pm 100$  vs  $190 \pm 81$  minutes,  $p < 0.001$ ) and length of hospital stay ( $11.4 \pm 7.9$  vs  $6.4 \pm 4.1$  days,  $p < 0.001$ ). An analysis of possible cut-offs rounded to one decimal demonstrated that a cut-off of 9.2 maximized the univariate odds ratio (OR 2.05; 95% CI 1.56 – 2.71) and also the covariate-adjusted odds ratio (OR 1.544; 95% CI 1.133 - 2.105) among all cut-offs. On multivariate analysis, presence of diabetes mellitus [Odds ratio: 1.97 (95% Confidence Interval: 1.27 - 3.08),  $p = 0.003$ ] and NLR on POD2  $\geq 9.2$  [OR: 1.43 (95% CI: 1.03 - 1.98),  $p = 0.02$ ] were significantly related to postoperative complication.

**Conclusions/Discussion:** Neutrophil lymphocyte ratio after colorectal surgery may provide clinicians with an additional tool for identifying high risk patients for postoperative complications. Routine use of neutrophil lymphocyte ratio may lead to early intervention and potentially improve the management of complications after colorectal surgery.

#### COMBINED ENDOSCOPIC AND LAPAROSCOPIC SURGERY OFFERS IMPROVED PATIENT OUTCOMES VERSUS LAPAROSCOPIC COLECTOMY FOR ENDOSCOPICALLY UNRESECTABLE COLORECTAL NEOPLASMS.

GS2

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**Purpose/Background:** Large, sessile or inaccessible colorectal polyps are often deemed unresectable by endoscopic means and thus referred for a formal colectomy. This increases the operative risk to the patient and recovery time. As endoscopic techniques progress, resection of these neoplasms is becoming possible. Resection can often be facilitated with laparoscopic assistance, as advancements have enabled more aggressive resection such as endoscopic mucosal resection (EMR) or endoscopic submucosal dissection (ESD) without the inherent morbidity of a formal colectomy. The purpose of our study is to compare combined endoscopic and laparoscopic surgery (CELS) to formal laparoscopic colectomy (LC) in the treatment of colorectal neoplasms.

**Methods/Interventions:** We present a single institution case-control observational study from January 2015 through October 2016, representing a series of patients with endoscopically unresectable colorectal neoplasms referred for surgical intervention. Sixteen individuals were selected for CELS during this period. They were then compared with 16 randomized LC patients during the

same time period. Lesions were deemed “unresectable” due to various characteristics, including polyp size, location, and sessile nature. The biopsies on these polyps were required to result in benign pathology. If malignancy was identified, the patient proceeded for oncologic resection. CO<sub>2</sub> videocolonoscopy was utilized to identify the lesion and determine feasibility of endoscopic resection. Various endoscopic and laparoscopic techniques were utilized including submucosal saline lift, dual channel scope with endoscopic graspers, IT knife, and endoscopic snares. Laparoscopic assistance was utilized for retraction, better polyp visualization and access, suture repair or imbrication, omental interposition, or wedge resection. Patients were followed for postoperative complications, estimated blood loss (EBL) length of stay (LOS), operative time and total cost.

**Results/Outcome(s):** Sixteen patients were identified in the CELS group and compared to 16 matched, randomized individuals in the LC group. Total LOS, EBL, postoperative complications and operative time and cost were analyzed for each patient and compared between the CELS and LC groups. Between-subjects analysis revealed that those in the CELS group had statistically significant lower operative times (average 161 mins in CELS vs 252 mins in LC), EBL (average 8.13cc in CELS vs 65.12cc in LC), and LOS (0.63 days in CELS vs 3.19 days in LC) [all with  $p < 0.001$ ] when compared to their LC counterparts.

**Conclusions/Discussion:** CELS for the removal of endoscopically unresectable benign colorectal neoplasms offers a safe, cost-effective, and minimally invasive alternative to formal laparoscopic colectomy in select patients with lower operative times, less EBL, and shorter length of stay.

#### A SURGICAL CLOSTRIDIUM ASSOCIATED RISK OF DEATH SCORE PREDICTS MORTALITY AFTER COLECTOMY FOR CLOSTRIDIUM DIFFICILE INFECTION.

GS3

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**Purpose/Background:** A *Clostridium difficile*-associated risk of inpatient death score (CARDS) was recently developed and validated using a national cohort of both non-surgical and surgical patients admitted with *Clostridium difficile* infection (CDI). However, risk scores specifically designed to estimate mortality following surgery for CDI are currently unavailable. The aim of this study was to develop a risk score for patients with CDI who underwent total abdominal colectomy (TAC) due to failure of medical therapy.

**Methods/Interventions:** A retrospective cohort study (2005–2014) was performed using the National Surgical

Quality Improvement Project (NSQIP) Participant Use File to identify all patients undergoing TAC with a primary diagnosis of CDI. Clinical variables reflecting patients' acute and chronic comorbidities, similar to the original CARDS study, were used to construct a model estimating predicted probability of mortality after surgery, referred to as surgical CARDS (sCARDS). Risk estimates were compared to those obtained using the American College of Surgeons NSQIP risk calculator, assuming a similar distribution of ASA classification.

**Results/Outcome(s):** A total of 532 patients who underwent TAC for CDI were identified, of whom 32.7% experienced 30-day postoperative mortality. Patient covariates significantly associated with mortality included age greater than 80 years (odds ratio [OR] 5.5,  $P=0.003$ ), need for preoperative mechanical ventilation (OR 3.1,  $P<0.001$ ), chronic steroid use (OR 2.9,  $P<0.001$ ), underlying cardiopulmonary disease (OR 2.0,  $P=0.001$ ) and acute renal failure (OR=1.7,  $p=0.03$ ). These and other comorbidities, including hepatic disease, a cancer diagnosis and diabetes mellitus, were used to construct a model to estimate the predicted probability of mortality, which ranged from 8.0% to 96.1% based upon individual comorbidity profiles. At intermediate levels of comorbidities, estimates of postoperative mortality differed substantially to those obtained using the NSQIP risk calculator, especially in terms of estimating the impact of chronic steroid use, acute renal failure and cardiopulmonary disease on mortality (Table 1).

**Conclusions/Discussion:** Among patients with CDI who require total colectomy, sCARDS allows for CDI-specific preoperative risk stratification, and may be helpful in avoiding futile surgery in the face of a comorbidity burden associated with a low likelihood of survival following surgery. The need for mechanical ventilation is associated with significantly higher odds of mortality, and

**GS3 Comparison of risk of 30-day mortality between sCARDS and ACS NSQIP Risk Calculators, varying by cumulative comorbidities for a hypothetical 65 year old patient requiring TAC for CDI**

Comorbidity	sCARDS*	ACS NSQIP*
Baseline 30-day Mortality	13%	14%
Mechanical Ventilation	32%	30%
Chronic Steroid Use	57%	36%
Acute Renal Failure	69%	43%
Cardiopulmonary	82%	62%
Hepatic	88%	79%
Cancer	89%	92%
Diabetes	86%	93%

\*Each line represents the cumulative risk of mortality for a given comorbidity along with the preceding comorbidities.

may represent a point before which surgical intervention should be considered. sCARDS suggests that the subgroup of CDI patients with intermediate levels of comorbidities have mortality following TAC that is significantly greater than estimated by the NSQIP calculator, which may affect discussions regarding surgical candidacy and timing of surgery.

**RISK FACTORS FOR AND MANAGEMENT OF PELVIC SEPSIS AFTER ILEAL POUCH-ANAL ANASTOMOSIS FOR CHRONIC ULCERATIVE COLITIS.**

GS4

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**Purpose/Background:** A total proctocolectomy with creation of an ileal pouch-anal anastomosis (IPAA) is the surgical treatment of choice for patients with chronic ulcerative colitis (CUC). Some patients will unfortunately develop pelvic sepsis, the leading cause of pouch failure and subsequent pouch excision. We sought to evaluate the 30-day incidence of pelvic sepsis and evaluate risk factors associated with this complication.

**Methods/Interventions:** We performed a retrospective review of all patients undergoing either two or three stage IPAA for CUC at our institution between January 2002 and July 2015. Baseline demographics, perioperative clinical and surgical variables, incidence of pelvic sepsis, and management outcomes were recorded from the medical records. Summary, univariate, and multivariate statistical analyses were performed.

**Results/Outcome(s):** A total of 910 patients underwent IPAA between January 2002 and July 2015. Seventy four patients (8.1%) developed pelvic sepsis within 30 days postoperatively. On univariate analysis, patient age  $\leq 50$  years at the time of operation ( $p = 0.048$ ), patients without a prior abdominal operation ( $p = 0.04$ ), an estimated blood loss (EBL) greater than 300 cc ( $p = 0.03$ ), and patients who received a postoperative blood transfusion ( $p < 0.0001$ ) had a significantly increased risk of pelvic sepsis. On multivariate analysis, receiving a postoperative blood transfusion remained a significant risk factor for development of pelvic sepsis (odds ratio, 3.72; 95% confidence interval, 1.90-7.02;  $p = 0.0002$ ). Preoperative steroid use ( $p = 0.16$ ) and immunomodulator use ( $p = 0.28$ ) were not significantly associated with pelvic sepsis. The diagnosis of pelvic sepsis was made as an inpatient in 62.2% ( $n=46$ ) of cases on a median postoperative day of 12 (range 6-20 days). Of those 74 patients with pelvic sepsis, 62% ( $n=46$ ) were managed with percutaneous drain placement, 16.2% ( $n=12$ ) were managed operatively, 14.9% ( $n=11$ ) were managed with antibiotic therapy alone, and 6.8% ( $n=5$ ) were managed with a

combination of operative and radiological procedures. The majority (91.5%, n=65) of patients with pelvic sepsis underwent ileostomy closure with restoration of bowel continuity.

**Conclusions/Discussion:** Pelvic sepsis, while occurring in less than 10% of patients, remains a dreaded complication following IPAA due to an association with pouch dysfunction and failure. We found postoperative blood transfusion was significantly associated with pelvic sepsis underscoring the need for meticulous intraoperative technique, liberal use of hemostatic agents intraoperatively, and careful selection for postoperative blood transfusion.

Factor	Odds Ratio	95% Confidence Interval	P Value
Postoperative blood transfusion	3.72	1.90-7.02	0.0002
Age < 50 years	2.00	0.96-4.71	0.06
Estimate Blood Loss > 300 mL	1.70	0.89-3.11	0.10
No previous abdominal operation	1.47	0.70-3.32	0.32
2 stage operation	1.25	0.53-2.79	0.59

Multivariate Analysis of Factors Associated with Pelvic Sepsis

### CASE-MATCHED COMPARISON OF LONG-TERM FUNCTIONAL AND QUALITY OF LIFE OUTCOMES FOLLOWING LAPAROSCOPIC VS. OPEN ILEAL POUCH-ANAL ANASTOMOSIS.

GS5

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**Purpose/Background:** Laparoscopic ileal pouch-anal anastomosis (L-IPAA) is associated with recovery benefits when compared with open (O-IPAA). There is limited data on comparative long-term quality of life and functional outcomes, which this study aimed to assess.

**Methods/Interventions:** An IRB-approved, prospectively maintained database was queried to identify patients undergoing L-IPAA (multiport, single-port or robotic), case-matched with O-IPAA based on age $\pm$ 5 years, gender, body mass index (BMI)  $\pm$ 5 kg/m<sup>2</sup>, diagnosis (ulcerative or indeterminate colitis, familial adenomatous polyposis), date of surgery $\pm$ 3 years, stapled/handsewn anastomosis, omission of diverting loop ileostomy, and length of follow-up $\pm$ 3 years. We assessed functional results, dietary, social, work, sexual restrictions and the Cleveland Clinic global quality of life score (CGQoL) at 1, 2, 3, 5 and 10 years postoperatively. Functional outcomes were assessed based on number of stools (total, day/night) and seepage protection use (day/night). Variables were evaluated with Kaplan-Meier survival curves, univariate and multivariate analyses.

**Results/Outcome(s):** Out of 4595 IPAAs, 529 patients underwent L-IPAA, of whom 404 patients were well matched 1:1 to an equivalent number of O-IPAA based on all criteria. Median follow-ups were 2.0 (0.5 – 17.8) vs. 2.4 (0.5 - 22.2) years in L-IPAA vs. O-IPAA, respectively (p=0.18). There were 266 (66%) and 196 (49%) patients

per group with follow-up longer than 3 and 5 years, respectively. L-IPAA was associated with significantly decreased number of stools at night and less frequent pad usage at 1 year, both during the day and at night (table), although differences disappeared with further follow-up. L-IPAA was also associated with improved overall CGQoL, and energy scores at 1 year postoperatively, and decreased social restrictions for 1-2 years postoperatively. CGQoL scores also became comparable during subsequent follow-up (table). There were no significant differences in quality of health, dietary, work or sexual restrictions. L-IPAA and O-IPAA had similar rates (p=0.07) and causes of pouch failure. Cumulative pouch survivals were 94% (95% confidence interval (CI) 89% - 97%) vs. 98% (CI 94% - 99%) for LIPAA vs. OIPAA and 94% (CI 89% - 97% CI) vs. 96% (CI 88% - 99%) at 5-year and 10-year follow-up, respectively (p=0.12). A subset multivariate analysis indicated incomplete donuts (p=0.01), anastomotic separation (p<0.001), pelvic sepsis (p<0.001) and fistula (p<0.001) as independent factors associated with pouch failure after L.

**Conclusions/Discussion:** Laparoscopic and open IPAA are associated with equivalent long-term functional outcomes, quality of life and pouch survival rates. The laparoscopic technique is associated with temporary benefits lasting up to two years.

### IMPROVED STAGE-SPECIFIC SURVIVAL AND SUPERIOR MARGIN NEGATIVITY FOR RECTAL ADENOCARCINOMA AT ACADEMIC COMPREHENSIVE CANCER INSTITUTIONS.

GS6

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**Purpose/Background:** Rectal adenocarcinoma is predominantly managed at three institution types, defined by the American College of Surgeons Commission on Cancer Program: academic comprehensive cancer institutions (AC), comprehensive community programs (CC), and community centers (CO). AC and CC participate in clinical research and are involved in over five hundred newly diagnosed cancer cases per year. CO provide care for one hundred to five hundred new cases yearly. The classification of AC includes National Cancer Institute-designated cancer centers and mandates multidisciplinary postgraduate resident education. In this study, we aim to compare short and long-term outcomes among these institution types.

**Methods/Interventions:** A retrospective review of the National Cancer Database from 2008-2014 was performed identifying patients who underwent neoadjuvant chemoradiation, surgical management, and adjuvant chemotherapy for pathologic stage II and stage III rectal cancer. Cases

were stratified based on institution types. Multivariate analysis was used to compare outcomes by institution type, and a Cox proportion hazard model was used to estimate long-term overall survival by institution.

**Results/Outcome(s):** Of 8,367 cases, 3,270 (39%) were treated at AC, 4,181 (50%) were treated at CC, and 916 (11%) at CO. Minimally invasive (laparoscopic or robotic) proctectomy was more prevalent at AC and CC compared to CO (AC 42%, CC 42%, CO 27%). Over this six-year study period, each AC-designated institution managed an average of approximately 15 cases of pathological Stage II/III rectal adenocarcinoma, each CC-designated institution individually managed approximately 8 cases and each CO-designated institution managed approximately 3 cases. Mean time between diagnosis and operative intervention was longest for AC ( $141.5 \pm 40.2$  days) compared to CC ( $129.9 \pm 35.0$  days) and CO ( $132.6 \pm 36.2$  days), ( $p < 0.01$ ). Compared to CC, AC demonstrated superior overall negative margin rates (OR 1.31, 95% CI 1.07-1.61,  $p < 0.01$ ) and superior negative circumferential margin rates (OR

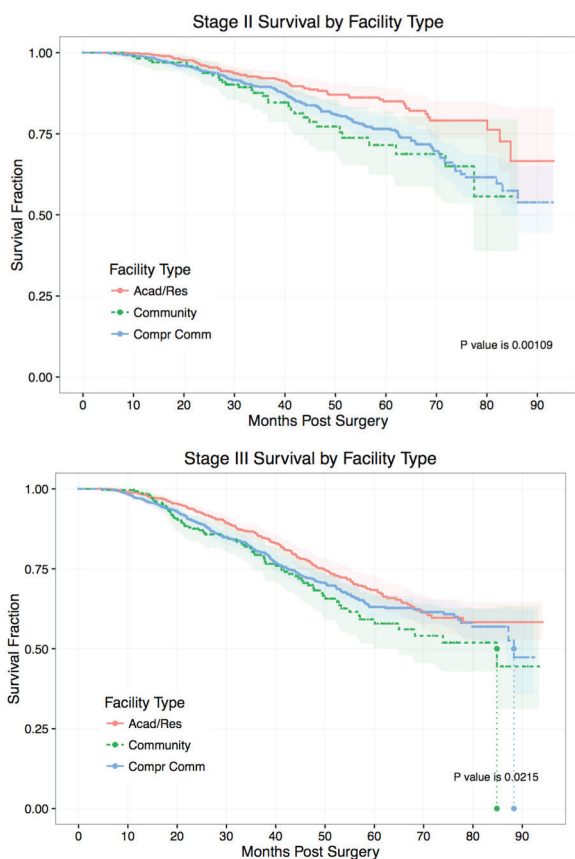
1.33, 95% CI 1.04-1.72,  $p < 0.05$ ). Compared to AC, both CC (1.28, 1.10-1.49,  $p < 0.01$ ) and CO (OR 1.45, 1.16-1.80,  $p < 0.01$ ) demonstrated higher 5-year death hazard rates. Patients with pathological stage II and Stage III disease treated at AC demonstrated superior 5-year overall survival compared to CC and CO - Stage II (AC 85%, CC 77%, CO 72%,  $p < 0.01$ ), Stage III (AC 68%, CC 63%, CO 59%,  $p < 0.05$ ).

**Conclusions/Discussion:** Rectal cancer care at academic comprehensive cancer institutions is associated with superior margin negativity and improved overall and stage-specific survival. As we move forward with the National Accreditation Program for Rectal Cancer (NAPRC), these best practices must be considered and replicated when possible.

**GS5 Quality of life and functional outcomes of laparoscopic vs. open IPAA**

Variable	Open IPAA (n=404)	Laparoscopic IPAA (n=404)	P value
<b>Overall CGQOL</b>			
1 y, n=312	0.7 ± 0.2	0.8 ± 0.2	0.001
3 y, n=263	0.8 ± 0.2	0.8 ± 0.2	0.94
5 y, n=255	0.8 ± 0.2	0.7 ± 0.2	0.99
<b>Energy level</b>			
1 y, n=312	6.9 ± 2.1	7.4 ± 2.0	0.02
3 y, n=263	7.2 ± 2.1	7.3 ± 2.0	0.64
5 y, n=255	7.0 ± 2.1	7.2 ± 2.1	0.46
<b>Seepage protection use during the day</b>			
1 y, n=312	70 (22.4%)	36 (11.6%)	0.04
3 y, n=191	53 (27.7%)	43 (22.7%)	0.43
5 y, n=184	41 (19.3%)	23 (12.5%)	0.56
<b>Seepage protection use during night</b>			
1 y, n=312	101 (32.4%)	65 (20.8%)	0.04
3 y, n=191	53 (27.7%)	43 (22.7%)	0.43
5 y, n=184	41 (22.5%)	64 (34.7%)	0.56
<b>Number of stools per day</b>			
1 y, n=312	5.7 ± 2.3	5.3 ± 2.1	0.08
3 y, n=224	6.1 ± 3.4	5.4 ± 2.2	0.27
5 y, n=213	5.8 ± 2.7	5.4 ± 2.1	0.45
<b>Number of stools per night</b>			
1 y, n=312	2.5 ± 1.7	2.0 ± 1.4	0.006
3 y, n=224	2.6 ± 2.1	2.2 ± 1.7	0.06
5 y, n=213	2.5 ± 1.7	2.1 ± 1.4	0.09
<b>Total number of stools</b>			
1 y, n=312	8.1 ± 3.1	7.0 ± 2.8	<0.001
3 y, n=224	8.5 ± 5.0	7.5 ± 3.2	0.22
5 y, n=213	8.0 ± 3.6	7.3 ± 2.7	0.22

IPAA=ileal pouch anal anastomosis; CGQOL = Cleveland Clinic global quality of life score



Stage II and Stage III Survival by Facility Type

## MUSCLE FRAGMENT WELDING: ONGOING CLINICAL SERIES WITH ILLUSTRATED TECHNIQUE FOR CONTROL OF SACRAL PLEXUS HEMORRHAGE.

GS7

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**Purpose/Background:** Despite multiple publications in the colon and rectal literature on muscle fragment welding, it remains apparent there is a lack of awareness of this technique. Rectal mobilization requires careful dissection as massive sacral bleeding, although rare, can be a life-threatening complication. Whenever this type of hemorrhage is encountered, the first step is adequate exposure. Extending the incision or converting from minimally invasive operations to an open exposure is mandatory in our opinion. Direct pressure should be applied with pelvic packing and additional suction equipment set up. Alerting the anesthesia team and resuscitation of the patient with blood products is vital. Next, different techniques used to alleviate bleeding should be considered. Pelvic packing, suture ligation and application of metallic thumbtacks have traditionally been described. However, given the need for re-exploration, risk of pelvic sepsis and potential

for anastomotic disruption, pelvic packing has fallen out of favor. Furthermore, difficulty in obtaining thumbtacks and retained foreign objects in the pelvis has made this option less attractive. Suture ligation, although useful for a single bleeding vessel, is not appropriate in the setting of massive, diffuse hemorrhage. We have adopted the technique of muscle fragment welding for massive sacral plexus bleeding as first described by Hangzhou in 1994. This review will aim to discuss sacral plexus anatomy, describe the muscle fragment welding technique with stepwise illustrations and discuss our ongoing clinical series where this technique has been applied. We believe that all surgeons operating in the pelvis should be aware of this technique, as it is a matter of when, and not if massive sacral bleeding will occur.

**Methods/Interventions:** This is an ongoing retrospective review of twelve patients who underwent muscle fragment welding, with four additional patients since our published review in 2003. Our technique requires adequate exposure, packing the pelvis and stabilization of the patient. A small piece of rectus abdominus muscle, 1.5-2 cm, is harvested and held in place with long forceps against the site of bleeding, functioning as a “biologic welding rod”. Electrocautery is adjusted to the highest setting and applied to the tip of the forceps to “weld” closed the bleeding point. The current is delivered until the muscle fragment and underlying presacral tissue turn into a charcoal gray coagulum.

**Results/Outcome(s):** This technique was successful for control of sacral plexus bleeding in all twelve patients. No significant complications were encountered during our application.

**Conclusions/Discussion:** Muscle fragment welding is a safe, readily available, and highly effective method of controlling massive sacral bleeding. This step by step illustration will demonstrate the technique used in our practice since 1996.

## IMPACT OF FREQUENCY OF OPERATING ROOM STAFF CHANGES ON COMPLICATIONS IN COLORECTAL SURGERY: A POTENTIALLY MODIFIABLE FACTOR TO IMPROVE PATIENT OUTCOMES.

GS8

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**Purpose/Background:** Operating room circulator and scrub technicians are often given breaks by other staff during surgical procedures, especially when surgeries are long or start later in the day. There is minimal reported data on how this factor impacts surgical outcomes. Our literature review uncovered no reports on the impact of this variable on complications in patients undergoing bowel resection. Therefore, our aim was to evaluate the

effect of operating room staff handoffs on surgical patient complications within 30 days of a colorectal surgery.

**Methods/Interventions:** Patient data from 2012 to 2016 was extracted from an electronic medical record of a tertiary care academic center. Patients aged 18 to 97 who underwent a colorectal intervention involving a bowel anastomosis with complete charting documentation were included. Multivariate logistic regression models were used to evaluate the effect of intraoperative staffing changes on patient outcomes. The primary outcome was morbidity and mortality within 30 days of index procedure. Models were adjusted for patient demographics and comorbidities as well as operative factors including start time, complexity, and procedure length.

**Results/Outcome(s):** 980 patients were captured through ICD-9 and CPT code extraction. Of those, 644 patients fit our selection criteria. The morbidity rate was 25% within 30 days of surgery, ranging from minor complications including wound infection to major complications such as anastomotic leak. Having the same scrub technician start and finish the case (two intraoperative scrub changes) was a protective factor against complications in procedures longer than 130 minutes (OR 0.40,

95% CI 0.17-0.94,  $p=0.036$ ). The strongest predictors of complications were patient factors including heart disease (OR 2.38, 95% CI 1.16-4.89,  $p=0.018$ ), Caucasian race (OR 2.10, 95% CI 1.07-4.09,  $p=0.030$ ) and other race (OR 2.54, 95% CI 1.18-5.49,  $p=0.017$ ); and operative factors, including procedure type such as ileostomy takedown (OR 0.25, 95% CI 0.09-0.70,  $p=0.008$ ) and low anterior resection (OR 0.20, 95% CI 0.05-0.83,  $p=0.027$ ), open vs. laparoscopic surgery (OR 2.11, 95% CI 1.27-3.51,  $p=0.004$ ) and high estimated blood loss (OR 2.97, 95% CI 1.12-7.85,  $p=0.028$ ).

**Conclusions/Discussion:** In our analysis of colorectal surgery patients having the same scrub technician start and finish the case was protective against postoperative morbidity for longer cases. Patient race, presence of heart disease, procedure type, use of open surgery, and high estimated blood loss were significantly associated with postoperative complications. To our knowledge, this is the first investigation focusing on intraoperative handoffs and patient outcomes in colorectal surgery. Further studies on systemic factors including staff changes could guide operating room scheduling and staffing to reduce their potential impact on postoperative complications.



## RESEARCH FORUM

### INHIBITION OF RAB13 EXPRESSION IN LYMPH NODE STROMAL CELL-DERIVED EXTRACELLULAR VESICLES DECREASES THEIR PROMOTION OF COLORECTAL CANCER GROWTH AND METASTASIS.

RF1

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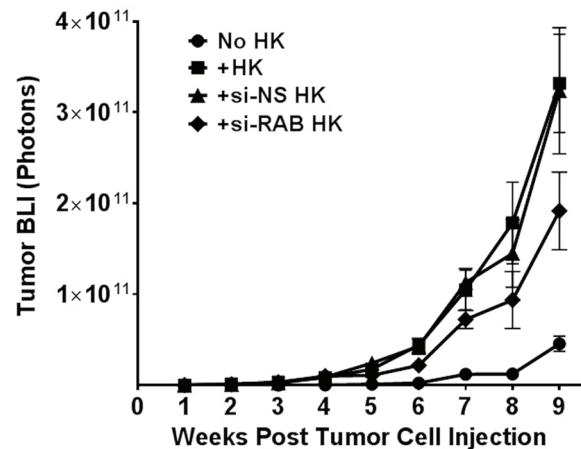
**Purpose/Background:** Ninety percent of CRC deaths are caused by metastasis. Lymph node (LN) involvement, depth of tumor invasion, and extra-nodal metastases influence the outcomes of CRC. Metastasis is closely connected with the interaction between CRC and LN stromal microenvironment. We hypothesized that LN stromal cells (LNSC) interact with CRC cells via RNA delivered by LNSC extracellular vesicles (EV). We aim to identify effector RNAs in LNSC EV and determine whether targeting them reduces primary tumor growth and metastases.

**Methods/Interventions:** We used Next-Generation Sequencing (NGS) of RNAs from LNSC, an LNSC cell line (HK) and EV from both cells, RT-PCR, WST-1 cell proliferation assay, transfection of HK cells with siRNA for RAB13 (si-RAB HK) or a Non-Silencing control (si-NS HK), orthotopic intra-rectal (IR) injection NOD/SCID mouse model of CRC, and whole body bioluminescent imaging (BLI) of luciferase expressing tumors.

**Results/Outcome(s):** We identified RNAs by NGS from 53,723 genes. Over 150 were enriched greater than 2-fold in EVs vs. cells, and 13 were common to EV in both LNSC and HK. RT-PCR confirmed these 13 RNAs were more highly expressed in HK-EV than HK cells. Among six CRC cell lines by RT-PCR, HT29 cells had the lowest expression of one gene, RAB13. When RAB13 RNA was silenced by siRNA transfection, RT-PCR showed a decrease in expression in HK cells from 50% at 24 hrs to 93% by 5 days. A proliferation assay was used to analyze the functional consequences of RAB13 knockdown, using HT29 cells treated with supernatant (containing EVs) from si-RAB HK cells or si-NS HK cells. There was a decrease in cancer cell proliferation in the presence of si-RAB HK vs. si-NS HK cell supernatant ( $p=0.0002$ ). We used our orthotopic mouse model to test whether silencing RAB13 in HK cells would change their tumor promoting effects in vivo. Luciferase-tagged HT29 cells (HT29-Luc,  $1 \times 10^4$  cells) were mixed without or with HK, si-RAB HK or si-NS HK cells, injected into mice and assessed weekly by BLI. HK cells promoted tumor growth. However, the presence of si-RAB HK cells impaired HT29-Luc cell tumor growth in comparison to that of HK cells ( $p=0.0018$ ) or si-NS HK cells ( $p=0.0207$ ) at 9 weeks post injection (Fig 1). At necropsy, the HT29-Luc tumor weights were significantly lower in si-RAB HK group than

in HK ( $p=0.0138$ ) or si-NS HK cell groups ( $p=0.0097$ ). Furthermore, liver and lung metastases were significantly lower when RAB13 expression was decreased in HK cells ( $p=0.0444$  and  $p=0.0240$  respectively).

**Conclusions/Discussion:** Rab-13 is a Ras-related small GTPase with roles in membrane trafficking. We have demonstrated the importance of this gene in the stromal cell promotion of CRC tumor initiation and metastasis and hope to use this to help develop new therapeutics based on the clarification of this cancer-related biological pathways.



**Figure.** HT29-Luc cells ( $1 \times 10^4$ ) mixed with media (No HK), HK, si-NS HK, or si-RAB HK cells ( $3 \times 10^5$ ) then injected IR into 6 mice/group and evaluated by BLI weekly.

### DNA REPAIR GENES AND RESPONSE TO NEOADJUVANT CHEMORADIATION IN RECTAL CANCER: A PREDICTIVE SCORE TO IDENTIFY THE COMPLETE RESPONDER.

RF2

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**Purpose/Background:** Neoadjuvant chemoradiation (nCRT) may lead to complete tumor regression in a proportion of patients and may offer the opportunity for organ-preserving strategies. Pre-treatment prediction of tumor response to nCRT would allow identification of ideal candidates to this treatment alternative avoiding the unnecessary detrimental effects of radiation for patients unlikely to develop complete response (CR). Deregulation of DNA repair pathways may be involved in several carcinogenic processes of human cancers including colorectal malignancies. The purpose of this study was to develop and test the performance of DNA repair deregulation score in the prediction of tumor response to neoadjuvant CRT by comparing patients with CR and incomplete response (IR).

**Methods/Interventions:** Twenty-five patients with T2-3N0-1M0 distal rectal cancer underwent pre-treatment biopsy collection prior to nCRT. All patients underwent 50.4-54Gy of radiation and 5FU-based chemotherapy. We performed global gene expression analysis using RNAseq to search for differentially expressed DNA repair genes between patients with complete and incomplete response to nCRT. Differentially expressed genes according to tumor response were selected to establish an 8-gene score (XPA, XRCC3, ATRIP, UBE2A, APEX2, NEIL2, HTLF, XRCC4). Expression values in RPKM of up-regulated genes among CRs were multiplied by +1. Expression values for down-regulated genes among CRs were multiplied by -1. The sum of all expression values for all 8 genes was performed to determine individual score results for each patient. Average scores between CR and IR were compared. A ROC curve was created to estimate the predictive value of the score.

**Results/Outcome(s):** Overall 9 patients developed CR and 16 incomplete responses to nCRT and were included in the study. 120 million sequences were generated for each sample and were mapped to the human genome reference sequence (Hg19) using Bioscope software. The average score was 28 for CRs and 16 for IR ( $p < 0.001$ ). The ROC curve resulted in an AUC 0.94 with high sensitivity (87%) and specificity (100%) using a cutoff of  $>20.5$  for the prediction of response.

**Conclusions/Discussion:** A DNA deregulation score may provide accurate prediction of tumor response to nCRT and may be used in clinical practice to select ideal candidates more likely to develop complete response to treatment. Prospective and independent validation is required before definitive implementation into clinical practice.

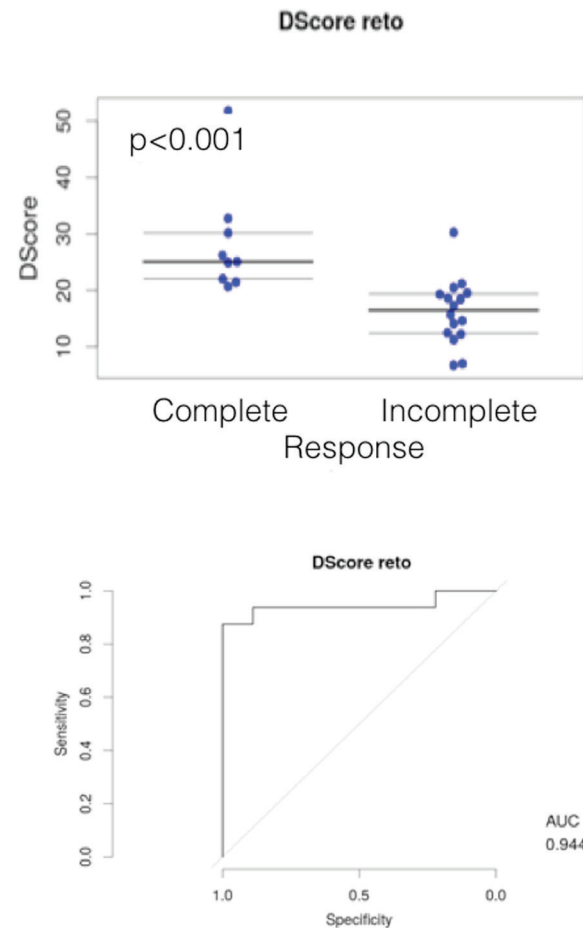


Figure. DNA deregulation score for complete and incomplete responders to nCRT. The ROC curve for the prediction of response with high sensitivity and specificity.

### WHY HAVE US RATES OF PRIMARY ANASTOMOSIS WITH DIVERTING ILEOSTOMY IN PATIENTS WITH ACUTE DIVERTICULITIS REQUIRING URGENT OPERATIVE INTERVENTION PLATEAUED?

RF3

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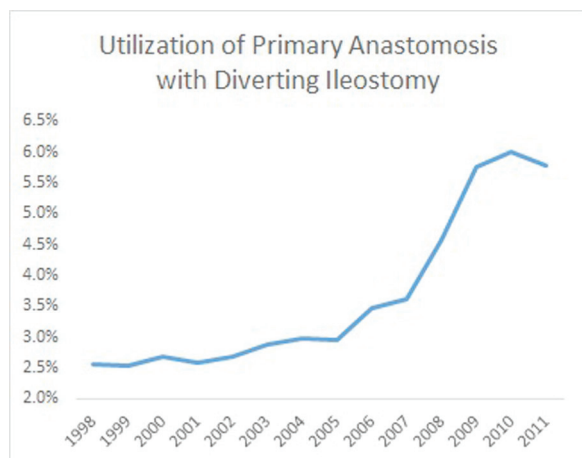
**Purpose/Background:** Prior studies suggested that emergent resections and anastomosis with diverting ileostomy (DI) may be safe even with perforated diverticulitis requiring urgent surgical intervention. Recent ASCRS guidelines suggest anastomosis be performed based on clinical factors and surgeon preference. This study aims to 1) describe DI utilization versus colostomy with Hartman pouch (C) for acute diverticulitis in a nationally representative cohort 2) compare outcomes of DI versus C 3) and identify factors that may justify C instead of DI.

**Methods/Interventions:** Multi-institutional cohort study of patients in Nationwide Inpatient Sample

(1998-2011) who were admitted and treated with urgent/emergent colectomy for diverticulitis. Patients were identified and categorized as DI vs C by ICD-9 procedure codes describing the type of stoma (ileostomy for DI or colectomy for C). Exclusion criteria included age <18 years or colon resection without diversion noted. Outcomes of DI patients were compared to C patients and multivariable logistic regression was used to identify patient and hospital specific variables associated with in-hospital mortality. Sensitivity analysis was also performed.

**Results/Outcome(s):** 40,605 patients requiring emergent/urgent colectomy for acute diverticulitis underwent fecal diversion: 39,090 had C and 1,515 (3.7%) had DI. Utilization of DI increased over the study period from 2.6% of all diverting operations to 5.8% (Figure); however, overall rate of DI remained low even at the end of the study period, with over 90% of patients undergoing C throughout. The median length of stay after DI was longer (15 days [9-22 days] DI vs. 11 days [8-16 days] C,  $p < 0.001$ ). Overall complication rates were higher in the DI group (32.0% DI vs. 24.0% C,  $p < 0.001$ ), and the mortality rate was higher in the DI group (15.9% DI vs. 7.0%, C  $p = < 0.001$ ). Logistic regression was performed to account for potential confounders that may explain higher mortality rates in the DI group (age, comorbid disease burden, gender, race, and socioeconomic status). DI was a statistically significant risk factor (2.0,  $p < 0.001$ ), in addition to increasing age (OR=30.9 in 90+ year old group) and Charlson comorbidity score (OR= 2.2 for score of 2) for in-hospital mortality. Sensitivity analysis of the composite poor outcome (in-hospital mortality or complication) revealed similar results.

**Conclusions/Discussion:** Utilization of DI for urgent and emergent cases of diverticulitis requiring operation intervention has increased; however, overall utilization of DI remains low. Poor outcomes, including complications and in hospital mortality may be the cause. Further analysis with more granular clinical data are needed to validate these findings, which appear to contradict existing consensus regarding safety of DI in carefully selected patients with purulent peritonitis.



## THE PREDICTIVE AND PROGNOSTIC ROLE OF TEXTURE ANALYSIS OF MAGNETIC RESONANCE IMAGING IN ASSESSING RESPONSE TO NEOADJUVANT CHEMORADIOTHERAPY IN LOCALLY ADVANCED RECTAL CANCER.

RF4

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Colchester, United Kingdom; London, United Kingdom; Chelmsford, United Kingdom

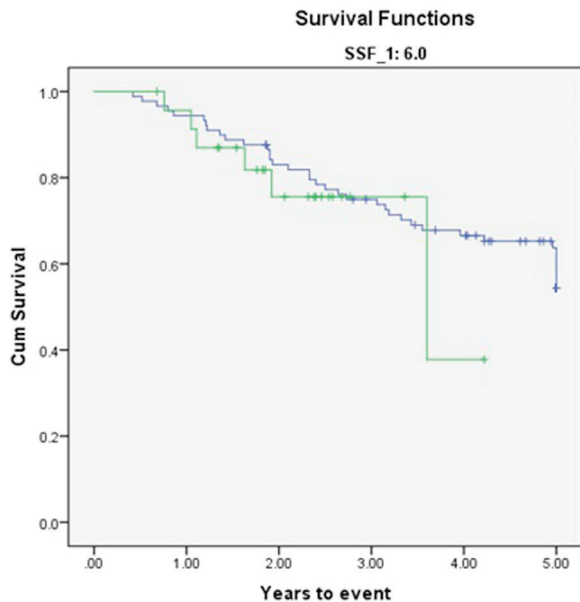
**Purpose/Background:** The management of locally advanced rectal cancer (LARC) has recently adopted a multi-disciplinary approach, with neoadjuvant chemoradiotherapy (NCRT), post operative chemotherapy, and with surgery remaining the backbone of treatment. After patients undergo NCRT, most patients experience downstaging of their cancer. A proportion of patients experience complete response (CR) with no cancer cells remaining, and therefore might not require surgery at all. However, accurately identifying patients preoperatively who have had a favourable response is still a challenge. Texture analysis (TA) is a new image biomarker that can be applied on medical images that assesses heterogeneity within a region of interest (ROI) on a sub-visual level. This study hypothesises that TA applied on T2-weighted MRI scans has the ability to accurately identify patients with complete or near-complete response and in predicting 5-year survival.

**Methods/Interventions:** This is a retrospective study including all patients diagnosed with LARC who underwent NCRT between January 2003 and July 2014 in Colchester Hospital. Texture parameters were extracted systematically on all pretreatment and posttreatment scans. Primary outcomes included accuracy of TA on MRI in identifying patients with favourable response. Accuracy was assessed using receiver operating characteristic (ROC) analysis. Correlation between textural parameters and survival was assessed using Kaplan-Meier's Log Rank and with pathological tumour regression grade using Mann-Whitney U test.

**Results/Outcome(s):** A total of 114 patients were included in the study, a total of 298 regions of interest were drawn on rectal cancers. Magnetic Resonance Texture-parameters – namely mean, standard deviation, entropy, and mean of positive pixels, with and without filtration - are all higher in patients with unfavourable response compared to favourable response ( $p < 0.05$ ). ROC analysis showed an accuracy of up to 88% with at least one texture parameter, mean of positive pixels, with a cut off value of 109.61. At least one textural parameter, entropy, can significantly predict survival at a cut off value of 6.495.

**Conclusions/Discussion:** Texture parameters extracted from T2-weighted MRI images exhibit a potentially significant early imaging biomarker in assessing response to NCRT, which can aid decision making in identifying

patients who might benefit from deferral of surgery. When personalising treatment, TA can also predict survival of patients who might exhibit a favourable response.



#### LIQUID BIOPSY FOR COLONIC CANCER: UTILITY OF CIRCULATING CELL-FREE DNA AS BIOMARKER.

RF5

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**Purpose/Background:** Circulating cell-free DNA (cfDNA) is a mixture of DNA from malignant and normal cells, and can be used as a liquid biopsy to detect tumour specific mutations. The aim of this study was to evaluate the potential utility of cfDNA as a liquid biomarker for colonic cancer. We investigated the clinical utility of common genetic mutations when detected synchronously in colonic cancer tissue and cfDNA isolated from blood samples.

**Methods/Interventions:** Matched plasma and formalin fixed paraffin embedded (FFPE) tissue samples, collected preoperatively from 55 patients with colonic cancer were analysed for total cfDNA levels and common genetic mutations. Total cfDNA was quantified from 1ml of plasma using an ALU repeat qPCR assay and a PNA-LNA approach was used to detect hot spot mutations in *KRAS*, *BRAF*<sup>V600E</sup>, and *PIK3CA*. Total cfDNA quantity and mutation status were compared to clinic-pathological features of colonic cancers and overall survival.

**Results/Outcome(s):** Total cfDNA levels correlated with tumour stage ( $p=0.003$ ) and tumour size (pT) ( $p=0.04$ ). In 23 (42%) FFPE cancer tissue samples, 30 mutations (*KRAS*  $n=10$ , *BRAF*<sup>V600E</sup>  $n=7$ , *PIK3CA*  $n=13$ )

were detected. *BRAF*<sup>V600E</sup> mutation was detected only in right colonic cancers. For mutant colonic cancers, 6 (86%) with *BRAF*, 6 (60%) with *KRAS* and 3 (23%) with *PIK3CA* mutations were detected in cfDNA isolated from matching plasma samples. The presence of mutations in cfDNA was also related to tumour T stage ( $p=0.05$ ). Circulating cfDNA mutations were found in all 4/13 cases with lymph node involvement and in 9/13 cases without lymph node involvement ( $p<0.005$ ). No significant survival differences were observed for mutant left sided colonic cancers for the presence of cfDNA mutations. For right sided colonic cancers, cfDNA mutation were associated with significantly poor overall survivals ( $p<0.005$ ).

**Conclusions/Discussion:** This study has shown that cfDNA is a potential surrogate biomarker for colonic cancers. However, a further study on a larger cohort is required.

#### INDUCED PLURIPOTENT STEM CELLS-DERIVED HUMAN INTESTINAL ORGANOID: A MODEL TO STUDY ULCERATIVE COLITIS.

RF6

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**Purpose/Background:** Ulcerative colitis (UC) is a relapsing disorder that predominantly affects young adults and results in significant patient morbidity/mortality in the US. The etiology of UC is largely unknown as it resides in the complex combination of pathologic interactions between the genome, the immune system and the micro-environment. Our recent findings suggest that CXCL8, a pro-inflammatory chemokine found in the microenvironment (stroma) of colons with colitis and colorectal cancer patients, contributes to colon tumorigenicity. However, the pathogenesis responsible for UC are poorly understood. Current *ex vivo* models of UC are inadequate to both recapitulate the complexity of the disease and the capacity for regeneration. We established an *ex vivo* human derived organoid model of UC to study gut regeneration and the pathogenesis of the disease. This superior model has both epithelial and mesenchymal components and thus may reflect major phenotypic characteristics of UC. We hypothesize that stromal CXCL8 increases the proliferation of UC-derived induced human organoids.

**Methods/Interventions:** Recent developments in the stem cell field have been applied to reprogram fibroblasts isolated from patients with UC into induced pluripotent stem cells (iPSCs) by introduction of the four Yamanaka factors. Next, a two-step procedure was applied to differentiate the iPSCs into defined endoderm and ultimately into colonic organoids. To test the functionality of the developed organoids, their response to stromal derived CXCL8 regarding growth characteristics was measured including size, number of organoids, and proliferative

rate. Briefly, dissociated organoids were co-cultured with normal and malignant fibroblasts (which secrete elevated levels of CXCL8) isolated from UC and CAC patients in hyaluronan based (HA) hydrogels.

**Results/Outcome(s):** Our results confirm that reprogramming of somatic cells isolated from the patients with UC to iPSCs is feasible. We have also established robust conditions to differentiate iPSCs to defined endoderm and then gut organoids thus reflecting the major phenotypes of the UC such as colitic stratified epithelium vs. the epithelial monolayer seen in normal colon- induced organoids. Developed organoids responded to the inflammatory mediator, stromal CXCL8, by demonstrating an enhanced proliferation rate, as well as an increase in the number and size of the forming organoids.

**Conclusions/Discussion:** Colitis-derived organoids recapitulate the epithelial phenotype as well as mucus secretion pattern. Furthermore, the organoids respond to the stromal CXCL8 with increased size, number and proliferative rate. The creation of the human derived organoid model of UC will permit not only investigating the pathogenesis of this disease on the epithelial, but also, will permit delineation of the role of inflammatory mediators in the microenvironment on disease progression.

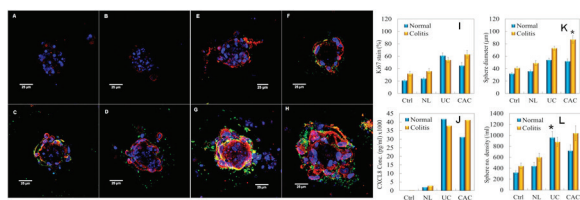


Figure 1. The effect of stromal CXCL8 on the proliferation, size and number of normal /colitis-derived organoids in HA hydrogels.

A: normal colon-derived organoids formed in HA hydrogels. B: Co-culture of normal colon-derived organoids and FBs. C: Co-culture of normal colon- derived organoids and colitis-derived FBs. D: Co-culture of normal colon-derived organoids and CAC FBs. E: colitis-derived organoids formed in HA hydrogels. F: Co-culture of colitis-derived organoids and normal colon-derived FBs. G: Co-culture of colitis-derived organoids and FBs. H: Co-culture of colitis-derived organoids and CAC FBs. I: Effect of FBs interaction on organoids proliferation. J: Effect of co-culturing on CXCL8 secretion level measured by Elisa assay. K,L: Effect of FBs interaction on organoids size and number. Ki67 (red), CXCL8 (green), and DAPI (blue), value of  $p < 0.05$

## THERAPEUTIC EFFECTS OF ELECTROACUPUNCTURE COMBINES WITH STEM CELL TRANSPLANTATION ON ANAL SPHINCTER INJURY-INDUCED FECAL INCONTINENCE IN A RAT MODEL.

RF7

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**Purpose/Background:** Bone marrow mesenchymal stem cells (BMSCs) have a restricted potential to differentiate into muscle, fat, nerve, and other tissues, and also can

secrete a variety of cytokines including growth factor, thus playing an important role in repairing damaged tissue. Studies have demonstrated the therapy effects of BMSCs on anal sphincter injury-caused fecal incontinence (FI). Besides, electroacupuncture (EA), which is used galvanism to replace the manual operation, can activate blood circulation to remove blood stasis, and then repair the damaged tissue. So the present study was to investigate the effects of combined EA and BMSCs on rat model of damaged anal sphincter. Here, BMSCs was isolated and the purity of BMSCs was confirmed by incubation with antibodies against CD34 and CD45 following flow cytometry analysis. The tissue repair as indicated by hematoxylin-eosin (HE) staining and immunohistochemistry staining of sarcomeric alpha actinin.

**Methods/Interventions:** A total of 60 Sprague-Dawley (SD) rats were randomly divided into 5 group: A, Sham-operated group; B, model group (Zutshi's protocol) injected with normal saline; C, model group treated with EA; D, model group injected with the 5<sup>th</sup> generation BMSCs; E, model injected with BMSCs and treated with EA. Tissue were resected according to different observation period (on 1st, 3rd, 7th, 14th day). All of the rats were sacrificed, the anorectal tissue at the 6th point place (about 5 mm x 10 mm x 5 mm) was resected. Half of the tissue was used to detect the cytokines (stromal cell derived factor-1 (SDF-1) and monocyte chemoattractant protein-3 (MCP-3)) expression, which can affect stem cell homing; and another half tissue was used for HE and immunocytochemistry, which can observe the repairing of damaged tissue.

**Results/Outcome(s):** The negative selection method showed CD34 and CD45 (specificity expressed in hematopoietic stem cells) had low rate in BMSCs. The 5<sup>th</sup> generation of BMSCs were used in the experiment. Real-time PCR analysis revealed that, compared with other groups, highest expression of SDF-1 and MCP-3 were observed in Group E, suggesting the promotion effects of EA on the homing of BMSCs. Furthermore, combined treatment of FI with EA and BMSCs in rats has the best effect for tissue repair as indicated by HE staining and immunohistochemistry staining of sarcomeric alpha actinin.

**Conclusions/Discussion:** EA can promote BMSCs homing. The combination of EA stimulation and BMSC transplantation can effectively repair impaired anal sphincters and provides a theoretical basis for non-operation treatment of muscle-impaired FI.

## ILEOSTOMY VS. COLOSTOMY FOR COLORECTAL ANASTOMOSIS PROTECTION: INTERIM ANALYSIS OF MULTICENTER RANDOMIZED CONTROLLED TRIAL.

RF8

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**Purpose/Background:** Protective ostomy formation is a routine practice in mid-low rectal cancer surgery. Historically temporary colostomy (COL) was performed, but since 1980s a loop ileostomy (IL) became the widespread method of colorectal anastomosis protection. In Russia still the preferred method is temporary loop transverse COL. The purpose of this prospective RCT was to define the best type of temporary ostomy in terms of 30-days postoperative readmissions due to dehydration in the reality of low budget Russian health care system with limited intensive care possibilities after discharge. The interim analysis is dedicated to evaluation of early postoperative complications.

**Methods/Interventions:** This RCT is conducted in two centers and includes patients with middle-low rectal cancer that can be offered restorative resection with temporary protective ostomy. Patients are randomized intraoperatively into IL or COL group. All patients received standard postoperative care, including routine IV and per os rehydration. The primary endpoint is the rate of readmissions due to dehydration.

**Results/Outcome(s):** Since January 2012 162 patients (73 men) included, 79 in COL and 83 in IL group. IL patients had significantly higher rate of postoperative ileus than COL patients (18 and 6 patients,  $p=0.015$ ), significantly longer demand of IV fluid and electrolyte compensation (6.9 and 3.5 days,  $p=0.042$ ) and significantly higher rate of readmission due to dehydration (8 and 0 patients,  $p=0.007$ ).

**Conclusions/Discussion:** Patients with protective loop IL have a higher chance of severe dehydration that demands readmission in early postoperative period. In the context of low budget health care without developed system of post-discharge intensive care provision at patient home, including electrolyte balance and hydration control, protective loop transverse COL is seen as a viable and more suitable option to protective loop IL for patients with middle-low rectal cancer undergoing restorative resections.

## SIMVASTATIN TARGETS COLORECTAL CANCER INITIATING CELLS IN VIVO AND ENHANCES THE EFFECTS OF RADIATION THERAPY ON PATIENT-DERIVED XENOGRAFT TUMORS.

RF9

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**Purpose/Background:** Response to neoadjuvant chemoradiation (nCRT) has been shown to result in improved oncologic outcomes in rectal cancer. Our group has previously shown that HMG-CoA reductase inhibitors, commonly known as statins, enhance the effects of radiation on colorectal cancer cells *in vitro*, and specifically target colorectal cancer initiating cells (CR-CIC), a cell population at the apex of tumor hierarchy and putatively responsible for tumor resistance to cytotoxic therapy. The aim of this study was to evaluate the effects of simvastatin on patient-derived xenograft (PDX) tumors in mice and explore its potential as a radiation-sensitizer *in vivo*.

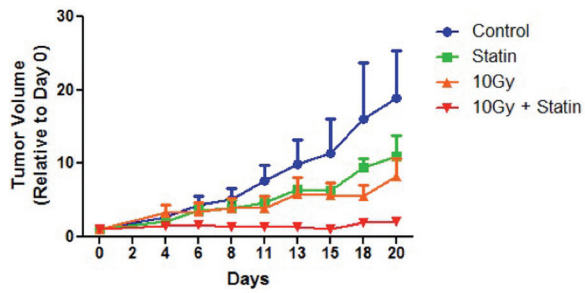
**Methods/Interventions:** Patient-derived xenografts (PDX) from the same human primary rectal cancer were established in the flanks of 24 NOD scid gamma (NSG) albino mice. Once the tumor volume reached  $250\text{mm}^3$  mice were randomized to 1 of 4 treatment arms: control, radiation alone (10Gy delivered in fractions of 2Gy over 5 days), oral simvastatin alone for the duration of the experiment, or combination therapy of radiation with simvastatin. Mice were sacrificed after 20 days or once the tumor reached  $2000\text{mm}^3$ . Tumor volume was measured every 2 days for the duration of the experiment. After the mice were sacrificed, the PDXs were dissociated into single cells and the rate of CR-CIC in tumors from each arm was estimated using limiting dilution assays (LDA).

**Results/Outcome(s):** All mice completed their assigned treatment without apparent toxicity. Combination therapy was more effective than either treatment alone in inhibiting tumor growth ( $p<0.01$ , Figure). While all tumors from the control and the simvastatin arms and 5/6 from the radiation arm grew larger than  $1000\text{mm}^3$ , this only occurred in 1/6 tumors treated with combination therapy ( $p=0.02$ ). On limiting dilution assay, the estimated frequency of CR-CICs was 1 in 200 cells in the control arm, 1 in 220 in the simvastatin arm, 1 in 20 in the radiation arm, and only 1 in 420 in the combination therapy arm ( $p<0.001$  compared to radiation alone).

**Conclusions/Discussion:** In agreement with our prior *in vitro* studies, oral simvastatin was an effective radiation-sensitizing agent in rectal cancer PDXs grown in mice. Importantly, in addition to effectively inhibiting tumor growth combined with radiation, simvastatin decreased the population of radiation resistant CR-CICs in the PDXs.

These data further support the rationale behind clinical trials using statins with nCRT for locally advanced rectal cancer.

**Patient Derived Xenografts +/- Statin +/- 10Gy**



## PODIUM ABSTRACTS

### RECOVERY FOLLOWING RECTAL CANCER SURGERY: RESULTS FROM THE MRC/EME ROLARR TRIAL.

S1

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**Purpose/Background:** It has been difficult to demonstrate a benefit for robotic as compared to laparoscopic rectal cancer surgery. The MRC/EME ROLARR trial showed there may be less need to convert to open surgery with robotic surgery in certain patients (obese, low rectal cancer, males), but short-term morbidity and oncological outcomes appear to be similar. It is not known if robotic surgery has an influence on postoperative recovery in the longer term.

**Methods/Interventions:** A total of 471 patients with rectal cancer were recruited to ROLARR between 2010 and 2016. Data on postoperative recovery was collected using the Multi-dimensional Fatigue Inventory (MFI) and Short Form-36 (SF-36) at baseline, 1 and 6 months postoperative. The MFI assess 5 scales of physical and mental health; a higher score indicates worse health. SF-36 is a multi-purpose, short-form health survey consisting of 8 health scales and provides a physical and mental component score; a lower score indicates worse health. Differences in MFI and SF-36 scores were analyzed between robotic and laparoscopic arms, adjusting for the ROLARR stratification factors. Exploratory analyses were performed for the whole cohort to determine factors predictive of worse outcome.

**Results/Outcome(s):** Data were available for analysis on 442/471 (93.8%) patients with MFI scores and 465/471 (98.7%) with SF-36 scores. The robotic and laparoscopic arms were balanced in terms of the ROLARR stratification factors with little difference in MFI or SF-36 scores at baseline. There was no significant difference in MFI scores (-0.005; 95%CI: -0.687, 0.676; p=0.987) or SF-36 scores (0.23; 95%CI: -0.96, 1.42; p=0.71) between robotic and laparoscopic arms. Patients experienced a worse MFI score (1.44; 95%CI: 0.082, 2.801; p=0.04) and worse SF-36 score (-7.99; 95%CI -11.23, -4.75, p<0.0001) between baseline and 1 month post-operation. By 6 months, there was no significant difference in MFI or SF-36 scores compared to baseline. Female MFI scores were consistently higher at all time points, but there was no gender difference in SF-36 scores. Patients undergoing abdominoperineal resection were significantly more affected as compared to those undergoing high anterior resection on both MFI and SF-36 scores. Patients undergoing neoadjuvant therapy had worse MFI and SF-36 scores at baseline, but were less adversely affected by their operation. There was no significant difference in MFI or SF-36 scores by BMI class. Patients with higher ASA experienced more fatigue at baseline, with less difference by 6 months postoperative.

**Conclusions/Discussion:** The ROLARR trial has failed to show a difference in postoperative recovery between robotic and laparoscopic surgery as assessed by MFI and SF-36 analysis. Patients in both arms experience worse health at 1 month but recover towards baseline by 6-months post-operative. Females and patients undergoing APR may be more affected by rectal cancer surgery.

### NODAL DISEASE IN RECTAL CANCER PATIENTS WITH COMPLETE CLINICAL RESPONSE AFTER NEOADJUVANT CHEMORADIATION: DANGER BELOW CALM WATERS.

S2

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**Purpose/Background:** A subset of patients with rectal cancer who undergo neoadjuvant chemoradiation (NCR) demonstrate a complete clinical response after therapy. However, true nodal response is not universal in these patients and is difficult to assess clinically. Quantification of risk of nodal disease would allow for targeted therapy with either radical resection or “watchful waiting”. We perform an analysis of a large national database to identify characteristics of node positive patients with a ypT0 resection.

**Methods/Interventions:** Patients in the National Cancer Database between 2006-2011 with stage II/III rectal adenocarcinoma who completed NCR followed by resection and who had ypT0 tumors were included. Patients with metastatic disease were excluded. Patients were divided into two groups – those with nodal disease (N+) and those without (N-). Characteristics of N+ were compared to N- using bivariate and multivariable analysis. The secondary outcome was overall survival.

**Results/Outcome(s):** There were 29,699 patients with stage II/III rectal cancer who underwent NCR and radical resection. 2,385 (8%) patients had ypT0 tumors on final pathology. Of these, 248 (10%) were N+. N+ patients were younger than N- patients (median age 58 vs. 61, p=0.001), more likely to have positive nodes on pre-operative staging (59% vs. 44%, p<0.001), signet ring features (3% vs. 0%, p=0.001), perineural invasion (1% vs. 0%, p<0.001), lymphovascular invasion (4% vs. 0%, p<0.001), and high grade (3/4) tumors (17% vs. 6%, p<0.001). There was no difference in timing of surgery after NCR. Interestingly, N+ patients were less likely to have an advanced clinical T-stage (cT3/4) preoperatively (73% vs. 85%, p=0.006). Of patients with cN0 disease at diagnosis, 8% were N+ after NCR and resection. In a multivariable analysis, factors predictive of nodal disease included age <65, increasing clinical N-stage, high tumor



grade (3/4), signet ring features, and lymphovascular invasion (Table). Overall 5-year survival was significantly decreased in N+ patients compared to N- (77% vs. 85%,  $p < 0.001$ ).

**Conclusions/Discussion:** Ten percent of patients with ypT0 tumors had positive nodes on final pathology. Factors associated with N+ disease included younger age (<65 years), clinical nodal disease at diagnosis and histology with high grade, signet ring features or lymphovascular invasion. Patients with any of these features should undergo radical resection regardless of post NRT appearance, especially given the association with increased mortality. Others could be suitable for “watchful waiting” strategies.

#### LOCAL EXCISION FOLLOWED BY POSTOPERATIVE CONTACT X-RAY BRACHYTHERAPY +/- EXTERNAL BEAM RADIOTHERAPY OR CHEMORADIOTHERAPY INSTEAD OF RADICAL RESECTION IN 180 PATIENTS WITH RECTAL CANCER.

S3

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**Purpose/Background:** Radical surgery incorporating total mesorectal excision has traditionally been the recommended treatment for rectal cancer with high risk features after local excision or polypectomy. This study analyzed intermediate-term outcomes of using contact x-ray brachytherapy (CXB) +/- postoperative external beam radiotherapy +/- chemotherapy as definitive treatment instead of radical surgery in patients who were either 1. Medically unfit or elderly 2. Were fit but had refused completion surgery or a stoma.

**Methods/Interventions:** All patients were identified from our prospectively maintained institutional database and had been diagnosed with adenocarcinoma of the rectum, had undergone a local excision procedure, had undergone full radiological staging and had been discussed

in a colorectal cancer multi-disciplinary team meeting. A total of 60Gy was given in 2 fractions over 2 weeks using CXB as an outpatient treatment to the site of local excision under direct vision through a proctoscope. After CXB standard post operative chemoradiotherapy was then given to 110 (61% of patients), external beam radiotherapy alone was given to 60 patients (33%) and CXB only was given to 10 (6%) of patients.

**Results/Outcome(s):** In total 180 patients with a median age of 70 (range 36-99 years) were treated. Local excision was performed by endoscopic mucosal resection  $n=57$  (31.7%), transanal resection  $n=64$  (35.6%), and transanal endoscopic microsurgery  $n=59$  (32.8%). Following local excision, pT stages were pT1=131 (71.9%), pT2=22 (25.7%), pT3=5 (2.3%). In total only 6 patients were clinically node positive. After a median follow up of 36 months, 164 patients (91%) remained disease free. Eight patients developed local recurrence only, 4 developed synchronous local and distant recurrence and 4 developed distant metastases alone. In total 4 patients underwent salvage rectal surgery (3 =R0) and 4 patients underwent resection of metastases (liver  $n=2$ , lung  $n=2$ ).

**Conclusions/Discussion:** Our single centre study has shown that the combination of a CXB boost +/- post operative external beam radiotherapy +/- chemotherapy results in high and sustained local control in patients after local excision of early rectal cancer who are high risk or choose not to have radical surgery. In the context of an ageing population and the introduction of bowel cancer screening programmes, the number of patients diagnosed with early rectal cancer and/or high surgical risk is constantly increasing and we propose that our technique has particular relevance within this context as a valid alternative to radical surgery.

#### S2 Multivariable analysis: factors associated with nodal disease in ypT0 rectal cancers.

Variable	OR	95% CI	Wald P value
Age < 65 Years	1.58	1.17-2.14	0.003
Clinical N Stage			0.001
0	REF		
1	1.76	1.33-2.33	
2	2.28	1.22-4.29	
Grade 3/4	2.58	1.74-3.83	<0.001
Signet Ring Features	3.96	1.31-11.99	0.01
Lymphovascular Invasion	7.91	2.84-22.00	<0.0001

### WATCH & WAIT AFTER COMPLETE CLINICAL RESPONSE TO NEOADJUVANT CRT: ARE CT3/4 TUMORS MORE LIKELY TO DEVELOP EARLY TUMOR RECURRENCE THAN CT2?

S4

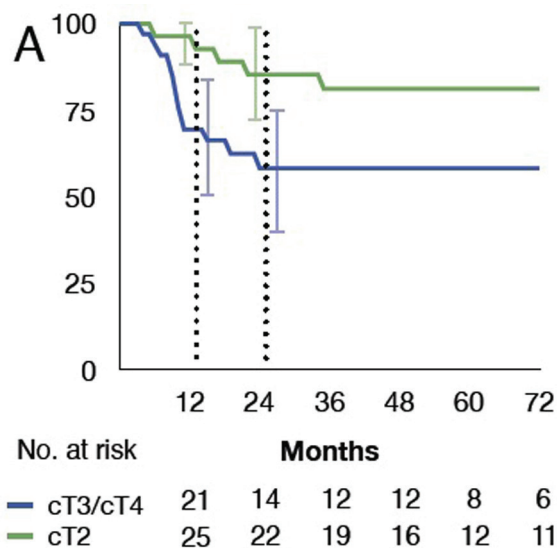
A. Habr-Gama, G. Pagin São Julião, B. Borba Vailati, C. Ortega, L. Fernandez, S. Araujo, R. Azevedo, R. Perez Sao Paulo, Brazil

**Purpose/Background:** Selected patients with rectal cancer and complete clinical response (cCR) following neoadjuvant chemoradiation (nCRT), have been managed nonoperatively (W&W) with acceptable outcomes. However, nearly 20% of these patients will develop early tumor regrowth. Identification of these patients could select candidates for more intensive follow-up. The aim was to investigate the influence of baseline T stage on early recurrences after a cCR managed by W&W following nCRT.

**Methods/Interventions:** Patients with distal rectal cancer (cT2-4N0-2M0) undergoing extended CRT (54 Gy + 5FU-based chemotherapy) were retrospectively reviewed. Patients were reassessed for tumor response at 10 weeks after RT completion. Patients with cCR (clinical, radiological and endoscopic) were managed by W&W and strictly followed. Initial cCR, early tumor recurrences (<12 months), late local recurrences and distant metastases rates were compared between patients according to baseline radiological T-stage.

**Results/Outcome(s):** Overall, 91 patients with rectal cancer underwent CRT. 61 patients developed initial cCR (67%). cT2 patients developed similar initial cCR rates compared to cT3/T4 (72% vs. 63%;  $p=0.403$ ). Early tumor recurrences were more frequent among baseline cT3/4 when compared to cT2 patients (30% vs. 3%;  $p=0.007$ ). There were no differences in late local recurrences ( $p=0.593$ ) or systemic recurrences ( $p=0.387$ ). Local recurrence-free survival was significantly better for cT2 patients at 1 year (96% vs. 69%;  $p=0.009$ ). After Cox regression analysis, baseline T stage was an independent predictor of improved local-recurrence free survival at 1 year. ( $p=0.03$ , OR=0.09 CI95% 0.01-0.81).

**Conclusions/Discussion:** cT2 patients that develop cCR after extended CRT managed non-operatively are less likely to develop early tumor regrowths when compared to cT3/4. cT3/4 patients should undergo more intensive follow-up after a cCR in order to allow early detection of early regrowths.



Local-recurrence free survival at 1-year was 96% and 69% for baseline cT2 and cT3/4 cancers respectively ( $p=0.009$ ); Local-recurrence free survival at 1-year was 96% and 69% for baseline cT2 and cT3/4 cancers respectively ( $p=0.009$ )

### ONCOLOGICAL OUTCOME AFTER SALVAGE TREATMENT FOR LOCAL RE-GROWTH FOLLOWING 'WATCH AND WAIT' FOR CLINICAL COMPLETE RESPONSE IN PATIENTS WITH RECTAL CANCER.

S5

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**Purpose/Background:** We have previously reported on 129 patients within the OnCoRe [Oncological Outcomes after Clinical Complete Response (cCR) in Patients with Rectal Cancer] project and noted that a third of patients developed local (mainly intra-luminal) regrowths within 3 years after decision to manage by 'watch and wait' (W&W) following chemo-radiotherapy. Here, we extend this cohort and describe the oncological outcomes after salvage treatment for local re-growth.

**Methods/Interventions:** Between 2005 and 2016, we followed a consecutive series of 156 patients with non-metastatic rectal cancer who completed pre-operative CRT (majority: 45 Gy in 25 daily fractions with concurrent fluoropyrimidine-based chemotherapy), who were considered at multi-disciplinary meetings across four neighbouring regions in the United Kingdom, to have cCR and offered W&W on a protocolized pathway. Primary outcome measure was R0 resection rate; secondary outcome measures were post-salvage colostomy rates and 3-year post-salvage surgery overall survival.

**Results/Outcome(s):** With a median follow-up from W&W decision of 36 months, 35% (54/156) developed

local re-growths (3-year actuarial rate: 38%). Three regrowths were either submucosal or mesorectal nodes. Of the 156 patients, 14 (9%) developed distant metastases. Of the 50 local re-growths without concomitant distant metastases, 42 (84%) underwent subsequent salvage surgery (R0: 40, R1: 1, awaiting surgery: 1); 3 underwent Papillon local radiotherapy; 3 had chemotherapy or no further treatment due to comorbidities; 2 opted for chemotherapy over surgery. The operations were: abdominoperineal resection, 28; anterior resection, 8; Hartman operation, 3; total pelvic clearance, 1; subtotal colectomy, 1 – permanent colostomy rate was 80% (33/41). The 3-year post-salvage surgery overall survival rate was 87%.

**Conclusions/Discussion:** In this extended cohort, the proportion of patients who developed local (mainly intra-luminal) regrowth remained at approximately a third. The majority of these regrowths were amenable to salvage surgery with a high R0 rate; in contrast with salvage surgery for local pelvic recurrence after initial rectal cancer resection. While cCR tumours are generally good prognosis cancers, nearly one in ten develop distant metastases; patient information sheets need to include this information.

#### PROSPECTIVE RANDOMISED TRIAL OF NEOADJUVANT CHEMOTHERAPY DURING THE “WAIT PERIOD” FOLLOWING PREOPERATIVE CHEMORADIOTHERAPY FOR RECTAL CANCER: RESULTS OF THE WAIT TRIAL.

S6

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**Purpose/Background:** Recent data has suggested that neoadjuvant chemotherapy may be associated with significant improvements in pathologic complete response (pCR) following neoadjuvant chemo-radiotherapy for rectal cancer. This study aims to determine whether the addition of additional cycles of chemotherapy during the “wait” period following neoadjuvant chemoradiotherapy for rectal cancer improves the pathologic complete response rate (pCR) to levels recently suggested.

**Methods/Interventions:** Rectal cancer patients were randomly allocated to either a standard 10 week wait period before surgery (standard chemo-radiotherapy, SCRT) or to receive 3 cycles of 5FU based chemotherapy following chemo-radiotherapy during a similar 10 week wait (extended chemo-radiotherapy, XCRT). All patients underwent resectional surgery. The primary endpoint was pCR as determined by blinded pathologic assessment.

**Results/Outcome(s):** Forty-nine patients were randomized (SCRT n =24, XCRT n = 25). The groups were well matched with respect to age, tumour level clinical stage

and procedures performed. pCR occurred in 10 patients overall but there was no significant difference in pCR between the groups (SCRT n = 6, XCRT n = 4 p = 0.49).

**Conclusions/Discussion:** The addition of 3 cycles of preoperative neoadjuvant chemotherapy during the wait period after chemo-radiotherapy for locally advanced rectal cancer is not associated with the substantial improvements in pCR suggested by some authors.

#### IMPACT OF PRE-CRT MR EMVI ON THE ONCOLOGIC OUTCOMES IN RECTAL CANCER PATIENTS WITH GOOD TUMOR RESPONSE AFTER PREOPERATIVE CHEMORADIATION.

S7

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**Purpose/Background:** Good tumor response after preoperative chemoradiotherapy (CRT) for locally advanced rectal cancer is associated with better oncologic outcomes. However, local or systemic recurrence still remains a problem in patients who have pathologic complete response (pCR), ypT1N0, and ypT2N0. This study aimed to investigate prognostic factors for disease recurrence in patients with good tumor response after preoperative CRT followed by curative surgery.

**Methods/Interventions:** Between January 2000 and December 2014, a total of 1150 patients who underwent preoperative CRT were retrospectively identified from patient data registered in Yonsei Multicenter Colorectal Cancer Electronic Database. All consecutive patients underwent standard long-course CRT followed by total mesorectal excision (TME) by using NCCN guidelines. Before and after preoperative CRT, patients who were included in this study underwent magnetic resonance imaging (MRI). Histopathological factors and MRI-based circumferential resection margin (mrCRM), adjacent organ invasion, and extramural vascular invasion (mrEMVI) status were analyzed to identify prognostic factors for disease recurrence. mrCRM was defined as lymph node or tumor deposits within 2.0mm of the mesorectal fascia on pre-CRT MRI. mrEMVI was defined as tumor deposits within extramural vascular structures on pre-CRT MRI. pelvic organ invasion was defined if abutting or direct invasion tumor was present on pre-CRT MRI.

**Results/Outcome(s):** A total of 346 patients were assessed with the median follow-up period was 44.5 (16.0 – 89.1) months. The 5-year disease-free survival (DFS) was not significantly different between pCR group (n=141) and ypT1/2 N0 group (n=205) (84.0% vs. 80.6%, p=0.551), respectively. The 5-year local recurrence rate (LRR) and systemic recurrence rate (SRR) were not significantly different between pCR group and ypT1/2 N0 group (5-year LRR, 5.4% vs. 10.5%, p=0.076; 5-year

SRR, 12.6% vs. 13.4%,  $p=0.920$ ), respectively. The 5-year DFS between mrEMVI (-) group ( $n = 324$ ) and mrEMVI (+) group ( $n=22$ ) showed significant difference (84.4% vs. 57.8%,  $p<0.001$ ). When analyzing 5-year DFS between mrCRM (-) and mrCRM (+), there was no significant difference. In the univariable analysis, abdominoperineal resection (APR) (HR = 2.459 (95% CI, 1.147 - 5.272);  $p=0.021$ ), pelvic organ invasion (HR = 2.178 (95% CI, 1.222 - 3.880);  $p = 0.008$ ), and mrEMVI (HR = 3.734 (95% CI, 1.479 - 9.427);  $p = 0.005$ ) were prognostic factors for DFS. In the multivariable analysis, mrEMVI (HR = 3.161 (95% CI, 1.179 - 8.477);  $p=0.022$ ) was significantly associated with DFS.

**Conclusions/Discussion:** Despite good tumor response in rectal cancer patients after CRT followed by curative surgery, pre-CRT mrEMVI status should be regarded as an adverse prognostic factor for DFS. Intensified chemotherapy and surveillance may be considered in pre-CRT mrEMVI positive good tumor responder in rectal cancer.

#### RISK FACTORS ASSOCIATED WITH CIRCUMFERENTIAL RESECTION MARGIN POSITIVITY IN RECTAL CANCER: A BINATIONAL REGISTRY STUDY.

S7a

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**Purpose/Background:** Rectal cancer outcomes have improved with the adoption of a multidisciplinary model of care. It is well-documented that circumferential resection margin (CRM) involvement remains a strong predictor of outcome and quality of care. However there is a spectrum of quality when viewed from a national perspective, as highlighted by the OSTRiTCH data on rectal cancer care in the USA. The aim of this study was to assess CRM involvement for rectal cancer across Australasia and identify predictors of CRM involvement.

**Methods/Interventions:** A prospective binational (Australia and New Zealand) colorectal cancer registry was investigated. All consecutive resected rectal cancer cases from 2000 to 2016 were retrieved and patient demographics, hospital location, socioeconomic status, level of colorectal training (Colorectal Surgical Society of Australia and New Zealand members), tumour staging, management details, and pathology were recorded. Univariate analysis was performed to identify the significant predictors of CRM. Hierarchical logistic regression was then performed to identify independent predictors and simultaneously adjusting for hospital and surgeon volume. The model was validated performing a bootstrap resampling method. The accuracy of the model was measured using Hosmer-Lemeshow goodness-of-fit test and area under receiver operating characteristics (AU ROC).

**Results/Outcome(s):** There were a total of 3106 patients identified, and 261 (7.75%) had positive CRM. On univariate analysis, patients treated by CSSANZ members ( $p=0.9$ ), surgeon in-training ( $p=0.1$ ) and patients located in rural area ( $p=0.37$ ), were not statistically significant. Interestingly low socioeconomic status ( $p=0.03$ ) and public hospital setting ( $p=0.0005$ ) were significant CRM positivity predictors, so were long course neoadjuvant chemoradiotherapy ( $p=0.0003$ ), low rectal tumours ( $<6$  cm;  $p<0.0001$ ), open technique, abdominoperineal resection, T3-4 and N1-2 ( $p<0.0001$ ). After adjusting for low socio-economic status, public setting, hospital and surgeon volume, the hierarchical logistic regression analysis identified a six-variable model to be independent predictors; urgent operation (OR 1.63), abdominoperineal resection (OR 1.14), open technique (OR 1.76), low rectal cancer (OR 1.71), T3-4 (OR 7.13) and N1-2 (2.1). This produced an AU ROC of 0.779 ( $p<0.0001$ ) and accuracy of 92.32% (calibration,  $p=0.69$ ). In the bootstrap re-sampling validation technique, the upper and lower limit for AU ROC was 0.772 and 0.766 respectively. The quantitative risk associated with CRM positivity is less than one percent (no risk factors) to 41% (five risk factors).

**Conclusions/Discussion:** The rate of CRM involvement in patients undergoing rectal cancer resection in Australasia is low and is influenced by a number of factors. Risk stratification of outcome is important with the increasing demand for publically accessible quality data.

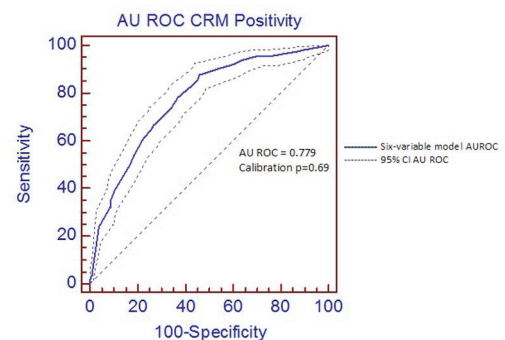


Figure 1: Shows ROC curve for the six-variable model in identifying risk factors for circumferential resection margin positivity with 95% CI. An AU ROC of  $> 0.7$  signifies a good model and calibration  $p$ -value  $> 0.05$  shows no difference between observed compared to predicted outcome.

#### RECTAL CANCER RESECTION WITH PATHOLOGIC UPSTAGING: ADJUVANT RADIATION VS. OBSERVATION.

S8

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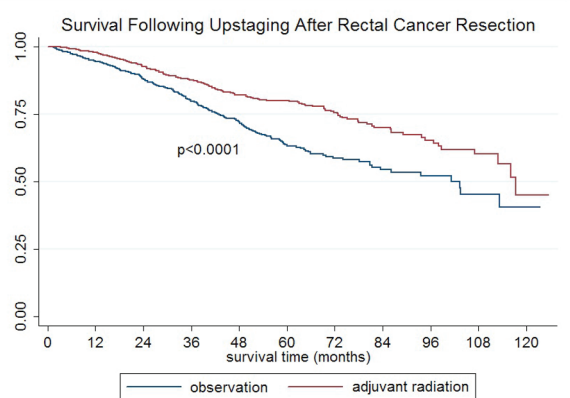
**Purpose/Background:** Surgical resection remains the primary treatment for Stage I rectal adenocarcinoma, and accurate pelvic staging is critical to identify patients appropriate for a surgery-first approach. Despite advances in imaging, some patients are pathologically upstaged

following resection. Observation and adjuvant radiation are offered as potential treatments, but data supporting one over the other is lacking. The present study hypothesized that survival rates vary based on observation vs. adjuvant radiation therapy following pathologic upstaging.

**Methods/Interventions:** Patients with clinical Stage I rectal adenocarcinoma who underwent rectal resection (LAR or APR) with subsequent pathologic upstaging (Stage 2 or 3 disease) were identified from the National Cancer Database (2004-2013). Patients were divided into observation vs. adjuvant radiation cohorts and analyzed using descriptive statistics, Kaplan-Meier method, and Cox multivariable modelling.

**Results/Outcome(s):** A total of 9,239 patients with Stage I rectal adenocarcinoma underwent resection-first approach, 23.9% (n=2,209) patients were pathologically upstaged to Stage 2 or 3. Postoperative pathologic staging were: 32.7% 2A, 28.9% 3A, 25.8% 3B, and 10.4% Stage 3C. The majority of patients were observed and did not receive adjuvant radiation (51.4% vs. 48.6%). Adjuvant radiation was more common in younger patients with less comorbidity, but more common following higher (3A, 3B, 3C) postoperative pathologic staging ( $p<0.001$ ). Sex and race were similar between cohorts. Postoperative radiation was associated with improved survival based on Kaplan-Meier analysis ( $p<0.0001$ ). Following Cox modelling adjusting for age, sex, race, comorbidity, and pathologic stage as covariates, adjuvant radiation was associated with a protective hazard ratio (HR) for survival (HR: 0.68, 95% C.I. 0.56-0.83;  $p<0.001$ ).

**Conclusions/Discussion:** Pathologic upstaging is a common problem following resection for Stage I rectal cancer. Younger patients with less comorbidities and higher pathologic stage are more likely to be treated with adjuvant radiation, and benefit from improved survival. Following multivariable regression adjusting for covariates, adjuvant radiation was still associated with a protective hazard ratio, suggesting that patients able to tolerate adjuvant radiation may benefit from improved survival for rectal cancer.



Survival following upstaging after rectal cancer resection, observation vs. adjuvant radiation

## A COMPARISON OF SURGICAL DEVICES FOR THE MANAGEMENT OF GRADE II-III HEMORRHOIDAL DISEASE: RESULTS OF THE LIGALONGO RANDOMIZED CONTROLLED TRIAL.

S10

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**Purpose/Background:** Surgical treatments for symptomatic hemorrhoidal disease (HD) performed with different types of device for a defined procedure have been recently compared in large randomized controlled trials (RCT) as HuBLu, eTHoS and LigaLongo. Little is presently known of the impact of the device type on the outcome of these procedures, namely Doppler-guided hemorrhoidal artery ligation and mucopexy (DGHL) or for stapled hemorrhoidopexy (SH) in term of adverse events and recurrence rate.

**Methods/Interventions:** To compare the outcome of patients treated into the Ligalongo RCT (ClinicalTrials.gov NCT01240772) for grade II-III HD according to the type of device used either for DGHL or for SH. **Design and Settings:** A prospective RCT comparing DGHL and SH was conducted from 2010 to 2013 in 21 national centers. In this study we questioned the role of the device on final outcome. In one arm of the RCT (N patients=193) THD™ (THD, Correggio, Italy) and HAL-RAR™ (AMI GmbH, Feldkirch, Austria) devices were respectively used for 104 and 89 patients. In the other arm (N=184) PPH-03™ (Ethicon Endo-Surgery, Cincinnati OH) and HEM™ staplers (Covidien, Inc.) were used in 106 and 78 cases. **Patients:** 377 patients randomized according to HD grade II (98) or III (279). The device choice was based upon surgeon's preference. **Main Outcome Measures:** Primary endpoint was operative-related morbidity at 3 months (D.90) based on the Clavien-Dindo procedure-related complication score. Secondary endpoints analyzed the clinical outcome at 1 year (M.12) in term of recurrence and reoperation rate.

**Results/Outcome(s):** In the DGHL group the number of ligations and mucopexies was higher in HAL-RAR™ ( $p<0.0001$ ). At D.90 morbidity was similar for THD™ and HAL-RAR™. In the SH group operating time was higher with PPH-03™ ( $p<0.0001$ ). Doughnut specimens were similar in size. At D.90 patients undergoing SH with PPH-03™ had a higher risk of postoperative grade 1 morbidity (anal urgency or incontinence) compared to those operated with HEM™ ( $p=0.003$ ) (Table 1). At M.12 no statistical difference was found between the 2 groups of each arm in term of grade III recurrence (THD™: 5, HAL-RAR™: 4 -  $p>0.9$  / PPH-03™: 3, HEM: 0 -  $p=0.12$ ) or reoperation (THD™: 9, HAL-RAR™: 7 -  $p=0.88$  / PPH-03™: 5, HEM™: 2 -  $p=0.70$ ). **Limitations:**

Randomization was performed on the procedure (DGHL or SH) and not on the device used by the investigators. For minor adverse events collection of data might have differed from center to center. No cost analysis has been performed in this part of the trial.

**Conclusions/Discussion:** In the LigaLongo RCT post-operative morbidity and outcome at 1 year were similar whatever the type of device used to perform grade II and III HD surgical procedures, DGHL and SH. These findings suggest that device type has little impact on results when they are used by well-trained surgeons.

#### COMPARISON OF STAPLED HEMORRHOIDOPEXY WITH TRADITIONAL EXCISIONAL SURGERY FOR HAEMORRHOIDAL DISEASE: A PRAGMATIC, MULTICENTER, RANDOMIZED CONTROLLED TRIAL.

S11

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**Purpose/Background:** Two commonly performed surgical interventions are available for grades II-IV haemorrhoids: traditional excisional surgery (TH) and stapled haemorrhoidopexy (SH). Uncertainty exists as to which is the most effective. The eTHoS trial was designed to establish the clinical and cost-effectiveness of stapled haemorrhoidopexy compared with traditional excisional surgery.

**Methods/Interventions:** The eTHoS trial was a large, open-label 2 arm parallel group pragmatic multicentre randomised controlled trial involving 32 United Kingdom hospitals. Patients with grades II-IV haemorrhoids who had not previously undergone SH or TH were included in the study. Participants were randomised to either SH or TH. Randomisation was minimised, 1:1 according to baseline EQ-5D, haemorrhoid grade, gender and centre

via an automated system. The primary outcome was area under the quality of life curve (AUC QoL) measured using the Euroqol-5D-3L (EQ-5D) descriptive system over 24 months. Secondary outcomes included disease-specific QoL, recurrence, complications, further interventions and cost effectiveness.

**Results/Outcome(s):** Between January 2011 and August 2014, 777 patients were randomised (SH 389, TH 388). SH was less painful than TH in the short term. Surgical complication rates were similar. EQ-5D AUC favoured TH; -0.073 95 % CI (-0.140,-0.006); p-value 0.0342. EQ-5D was higher for SH in the first 6 weeks after surgery but over 24 months the TH group had significantly better QoL scores. Symptoms and further interventions were significantly less in TH over 24 months. Incontinence was better in TH and tenesmus was less. SH was dominated by TH as it cost more than TH and was less effective than TH.

**Conclusions/Discussion:** This is the largest trial of its kind. SH had less short-term pain but, after 6 weeks, recurrence rates, symptoms, re-interventions and quality of life measures significantly favour TH. Tenesmus is less and continence is better after TH compared with SH. In addition, TH is cheaper. As part of a tailored management plan for haemorrhoids, TH should be considered over SH as the surgical treatment of choice.

#### SPHINCTER-SPARING ANAL FISTULA REPAIR: ARE WE GETTING BETTER?

S12

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**Purpose/Background:** Sphincter-sparing repairs (SSR) are commonly used to treat anal fistulas with significant muscle involvement. The aims of the current study were

#### S10 LigaLongo RCT - Adverse events at 3 postoperative months\* - Device comparison

Grade	Patients suffering at least one AE, n (%)			
	1	2	3	Total
DGHL				
THD (N=104)	13 (12.5)	11 (10.6)	2 (1.9)	26 (25.0)
HAL-RAR (N=89)	14 (15.7)	6 (6.7)	1 (1.1)	21 (23.5)
p-value	0.52	0.35	0.65	0.82
SH				
PPH-03	20 (18.9)	10 (9.4)	5 (4.7)	35 (33.0)
HEM	4 (5.1)	6 (7.7)	4 (5.1)	14 (17.9)
p-value	0.006	0.68	0.62	0.02

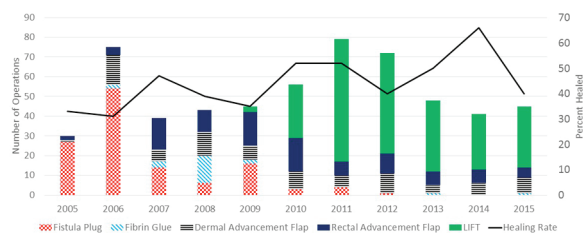
\*According to Clavien-Dindo procedure-related complication score - No death or grade IV adverse event in the all series

to evaluate the trends and efficacy of SSRs and determine the risk factors for fistula recurrence.

**Methods/Interventions:** A retrospective review of all patients with cryptoglandular anal fistulas who underwent a SSR between 2005 and 2015 at three academic institutions was performed. Patients with inflammatory bowel disease were excluded. Patient demographics, comorbidities, fistula characteristics, and type of operation performed were recorded. The primary outcome was the rate of fistula healing without recurrence. Fistula healing was defined as resolution of drainage with closure of the external opening. The relationship between fistula healing rates and clinical factors were analyzed.

**Results/Outcome(s):** 462 patients underwent 573 SSRs with a median follow-up of seven (range, 0-125) months. 220 SSRs (39%) resulted in healing, 283 (49%) resulted in recurrence, and 70 (12%) were lost to follow-up. The median time to fistula recurrence was three (range, 0-75) months with 79% and 91% of recurrences noted within six and 12 months, respectively. Univariate predictors of fistula recurrence included type of repair performed ( $p < 0.001$ ), institution ( $p < 0.001$ ), date of operation ( $p = 0.005$ ). Using multivariate analysis, type of repair performed ( $p < 0.001$ ) and institution ( $p = 0.021$ ) remained predictors of fistula recurrence. Patients treated with a dermal advancement flap, rectal advancement flap, or ligation of the intersphincteric tract (LIFT) procedure were less likely to recur compared to patients treated with a fistula plug or fibrin glue ( $p < 0.001$ ). Over time, there was a significant increase in utilization of the LIFT procedure ( $p < 0.001$ ) and a significant decrease in the utilization of fistula plugs and fibrin glue ( $p < 0.001$ ). Healing rates improved accordingly (Figure). There were no significant differences in healing rates with respect to patient age, gender, BMI, smoking status, diabetes, HIV, ASA classification, Charlson comorbidity index, fistula location, duration, Parks classification, depth of internal opening, associated abscess, use of a draining seton, use of a drain, or prior attempts at repair.

**Conclusions/Discussion:** Healing rates following SSRs of cryptoglandular anal fistulas are fair, but have improved over time with the use of better surgical techniques. This study demonstrates that fistula plugs and fibrin glue are inferior to LIFT and flap procedures and should generally be avoided. Continued studies are needed to assess long-term healing following a SSR and to better predict and ultimately prevent fistula recurrence.



**Figure:** Types of sphincter-sparing operations performed over time and their outcomes. LIFT = ligation of intersphincteric fistula tract.

## LIGATION OF INTERSPHINCTERIC FISTULA TRACT FOR FISTULA IN ANO: LESSONS LEARNED FROM A DECADE OF EXPERIENCE.

S13

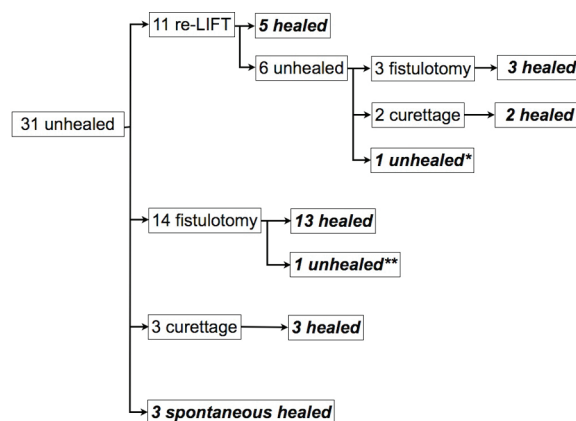
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**Purpose/Background:** Ligation of intersphincteric fistula tract (LIFT) is a well described sphincter preserving technique for the management of fistula in ano. In 2006, we reported our early experience with a primary success rate of 94.4%. Since then this findings has been supported by several short term studies, but long term results and secondary cure rates after LIFT failure remain unknown. This study aims to report a 10 year experience of LIFT with very long term followup, including the fate of unhealed fistula after LIFT.

**Methods/Interventions:** Retrospective analysis of single center data from May 2006 to October 2010. Patients with any type of fistula in ano who underwent LIFT were included in this study. The patients were followed until December 2016. Success was defined as absence of symptoms with no visible external opening.

**Results/Outcome(s):** In total 251 patients were identified, with an overall primary success rate of 87.65%. The healing rates of low transphincteric, intersphincteric, high transphincteric, semihorseshoe and horseshoe fistula were 92.1%, 85.2%, 60.0%, 89.0% and 40.0%, respectively. Of the 42 patients who had unhealed fistula after previous non-LIFT fistula surgery, 38 (90.48%) healed after LIFT on first attempt. There were 31 unhealed fistula patients after LIFT of which 3 spontaneously healed. The rest underwent either re-LIFT, fistulotomy (if the recurrence was intersphincteric), or simple curettage (if not internal opening was found). Ultimately, only 2 out of the original 251 patients remained unhealed. The incontinence rate was 0%.

**Conclusions/Discussion:** Ligation of the intersphincteric fistula tract is an effective technique for the treatment of fistula in ano, including unhealed fistula after other procedures.



Fate of unhealed patient after LIFT

## ANALYSIS OF INTERMEDIATE RESULTS IN A SINGLE CENTER AFTER VIDEO-ASSISTED ANAL FISTULA TREATMENT.

S14

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**Purpose/Background:** The sphincter saving VAAFT technique is becoming more and more common as a minimally invasive treatment in patients with perianal fistulas due to its feasibility and decreased risk of complications. We started to treat the perianal fistulas since April 2012. We present our results compared with the international literature, particularly patients who had a follow-up of at least 1 year. Furthermore, we evaluated the risk factors associated at recurrence of fistula.

**Methods/Interventions:** A retrospective analysis of a consecutive series of patients with perianal fistula who underwent VAAFT procedure, performed from April 2012 to April 2016, was done. Video equipment including specific fistuloscope was used. Preoperative clinical assessment was performed in all cases. The Parks' classification for anorectal fistulas was used. The exclusion criteria was the suspicion malignancy, or history of pelvic radiotherapy. We collected data about type of fistula, presence of chronic abscess, surgical procedure and recurrence disease, in particularity patients who had a follow-up of at least 1 year.

**Results/Outcome(s):** During the study period a total of 104 patients with anal fistula, underwent the VAAFT procedure. Patient's demographic characteristics are summarized in Table 1. The majority of fistulas were complex. Median follow-up was 17 (12-46) months. Mean operative time was 42(31-64) minutes. The internal orifice was closed in 5 cases with a stapler, in 74 cases with a flap and in 25 cases closing the muscular layer with stiches.

**S14 Characteristics of patients**

Gender (male)	81
Gender (female)	29
Age (years)	48,9
Smokers	27
Obesity (BMI>30Kg/m <sup>2</sup> )	13
Hypertension	26
Diabetes	5
BPCO	7
Chron`s disease	1
ASA 1	53
ASA 2	35
ASA 3	13
Previous Surgery	44
Anal abscess	19
Fistulectomy	24
Hemorrhoids	1
Chronic abscess	74

84 patients (82%) achieved healing trough VAAFT procedure. Twenty patients (19%) had recurrence and were treated trough re-VAAFT procedure resulting in a secondary healing rate of 100%. There were no intra-operative or postoperative complications. From uni- and multivariable analyses of variables potentially involved in the risk of failure of VAAFT, the age  $\geq$  50 years was the only factor associated at risk of recurrence.

**Conclusions/Discussion:** The VAAFT procedure for anal fistula is confirmed to be an effective, well tolerated and feasible technique with an acceptable recurrence rate during the follow-up. Our results confirm a successful treatment with a follow-up of at least 1 year aligned with the international literature. In case of recurrence, a re-VAAFT can be safely used for healing achievement with excellent results. Furthermore, our study demonstrated that age  $\geq$  50 years is a risk factor of failure of VAAFT.

## IS THE FAILURE OF LAPAROSCOPIC PERITONEAL LAVAGE PREDICTABLE IN HINCHEY III DIVERTICULITIS MANAGEMENT?

S15

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**Purpose/Background:** The laparoscopic peritoneal lavage (PL) is a conservative alternative to colonic resection in acute diverticulitis complicated with purulent peritonitis (Hinchey III). Despite the increasing number of prospective randomized studies comparing PL to colonic resection, the role of PL in the treatment of Hinchey III diverticulitis remains controversial. The main criticism against PL is the higher reoperation rate related to the perforation persistence or reopening. The purpose of this study was to characterize those Hinchey III diverticulitis patients at risk for failure after PL.

**Methods/Interventions:** **Methods:** with Hinchey II or IV diverticulitis diagnosed at laparoscopy were excluded. PL was not proposed to hemodynamically unstable patient. Patient characteristics and postoperative complications were retrospectively collected in order to identify risk factors associated with PL failure. Severe complications were Dindo score  $\geq$  3b complications. PL failure was defined as reoperation or death at 30 postoperative days.

**Results/Outcome(s):** Seventy-one patients (43 males, mean age 58 years [20-84 years]) diagnosed with Hinchey III diverticulitis at laparoscopy were included. American Society of Anesthesiologists (ASA) status was 1, 2 and 3 in 28, 32 and 11 respectively. No patient was ASA 4. Overall morbidity rate was 37%. PL failure was observed in 14 (20%) patients including 13 reoperations for sepsis persistence and 1 death related to a cardiac decompensation 20 days after sepsis resolution. No other severe complication was observed postoperatively. No severe



complication was observed after reoperation. Diabetes ( $p=0.037$ ), immunosuppression ( $p=0.002$ ) and ASA 3 score ( $p=0.019$ ) were associated with PL failure after univariate analysis. Patients that had at least one of the 3 risk factors had a 50% risk for failure whereas patients who had no risk factor had a failure rate of 14%. The only deceased patient combined the 3 risk factors. Age, gender, BMI, previous history of diverticulitis, duration of symptoms, fever and CRP levels were not associated with failure.

**Conclusions/Discussion:** This study is the first to characterize Hinchey III diverticulitis patients at risk for PL failure. Patients with diabetes, immunosuppressive drugs and/or ASA score  $\geq 3$  have higher risk for reoperation or death. Further studies are required to determine if primary sigmoid resection would offer better outcome to these patients.

## IMPLEMENTATION OF AN ENHANCED RECOVERY PATHWAY FOR ANORECTAL PROCEDURES IS ASSOCIATED WITH IMPROVED OUTCOMES.

S16

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**Purpose/Background:** Ambulatory surgery for anorectal procedures has been shown to be safe and effective. Specific perioperative pathways combining multiple interventions optimize outcomes associated with postoperative pain control and minimize unplanned returns to the emergency department (ED) or urgent care (UC). However, most of these studies are small case series without multi-institutional implementation and validation.

**Methods/Interventions:** An enhanced recovery after surgery (ERAS) pathway was gradually implemented at 14 Southern California Kaiser Permanente Medical Centers. All patients who underwent an anorectal procedure in 2015-2016 were included in this prospectively collected, retrospective review. The ERAS elements included preoperative education, the use of multimodal analgesia, ingestion of carbohydrate-rich clear liquids 2 hours prior to presenting to surgery, preferential use of monitored anesthesia care instead of general anesthesia, restriction of intraoperative intravenous fluids administration, administering or providing prescriptions for laxatives or stool softeners prior to surgery, and proactively calling patients within 72 hours of discharge. Each element of the ERAS protocol was analyzed independently for those that received it vs. those that did not. Multivariate linear and logistic regression analyses controlling for patient factors were estimated. Primary outcomes included postoperative recovery unit (PACU) pain scores and avoidable postoperative ED/UC visits within one week.

**Results/Outcome(s):** There were 1400 patients reviewed. Of these, 978 (70%) received at least one element of the ERAS protocol. Multivariate analyses showed that the use of MAC/Local anesthesia (versus general) resulted in lower maximum ( $p<0.01$ ) and final ( $p<0.01$ ) PACU pain scores and fewer avoidable postoperative ED/UC visits (Odds Ratio 0.56,  $p=0.015$ ). Providing stool softener prescriptions prior to the day of surgery resulted in fewer constipation related returns (OR 0.31,  $p<0.01$ ). Preoperative carbohydrate loading resulted in lower maximum PACU pain scores ( $p<0.01$ ) and fewer pain related returns (OR 0.43,  $p<0.01$ ), but higher constipation related returns (OR 7.9,  $p<0.01$ ). Finally, the use of local anesthetics was associated with decreased constipation related returns (OR 0.26,  $p<0.01$ ).

**Conclusions/Discussion:** Despite a modest overall adherence to an ERAS pathway for ambulatory anorectal procedures, there was improved postoperative pain control and decreased pain related returns, associated strongly with use of MAC/Local anesthesia over general anesthesia. We expect improved outcomes as adherence to the protocol increases.

Multivariate analysis for each element of the ERAS protocol

ERAS Process Elements - Patient Level, Anorectal Procedures		PACU Pain Score - Max		PACU Pain Score - Final		Avoidable Returns - All (Pain, Constipation, Urinary Retention)	
Phase	Element	Coeff	p	Coeff	p	OR	p
Preoperative	Preoperative Education	0.197	0.50	-0.205	0.19	0.939	0.91
Preoperative	Rx Given	0.069	0.75	0.067	0.50	0.572	0.15
Preoperative	Clears/Carbo Loading	-0.629	<0.01	-0.109	0.19	1.194	0.44
Preoperative	Multimodal Analgesia (>3)	-0.204	0.38	0.017	0.89	0.554	0.11
Intraoperative	MAC/Local Anesthesia	-0.927	<0.01	-0.379	0.01	0.564	0.02
Intraoperative	Local Anesthetic Used	0.297	0.18	0.258	0.08	0.656	0.11
Intraoperative	IV Fluids $\leq 500$ mL	-0.259	0.18	-0.128	0.38	1.076	0.87
Postoperative	Laxative/Stool softener	-0.184	0.65	0.066	0.60	2.664	0.06
Postoperative	Patient Called by KFH	-0.005	0.99	-0.229	0.20	1.145	0.78

## CLOSED INCISION NEGATIVE PRESSURE WOUND THERAPY IS ASSOCIATED WITH DECREASED SURGICAL SITE INFECTION IN HIGH-RISK COLORECTAL SURGERY LAPAROTOMY WOUNDS.

S17

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**Purpose/Background:** Surgical site infection (SSI) in colorectal surgery is common with significant associated healthcare resource utilization. Closed incision negative pressure therapy (CINPT) has been proposed as a means of reducing SSI through prevention of contamination and removal of fluid from the wound. We aim to assess the impact of CINPT on the incidence of SSI in a cohort of high-risk patients undergoing open colorectal surgery.

**Methods/Interventions:** From 2014 to 2016, all patients undergoing high-risk laparotomy within the division of colorectal surgery at a tertiary care center received CINPT via a customizable device (Prevena Incision Management System, KCI, an Acclivity company, San Antonio, TX)

applied over the intact incision for 5-7 days. High-risk laparotomy included those with one or more of pre or post-operative stoma, diabetes mellitus, obesity, preoperative steroid or immunosuppressant use and/or contaminated/dirty wound. All CINPT cases reviewed by the National Surgery Quality Improvement Project (NSQIP) were compared against similar institutional NSQIP reviewed historical controls. Patients with unplanned reoperation within 30 days were excluded. Patient characteristics were compared between CINPT and non-CINPT patients using two-sided t-test or Fisher's exact test as appropriate. SSI was determined via NSQIP review. Multiple logistic regression was used to determine independent predictors of SSI.

**Results/Outcome(s):** CINPT was utilized in 112 high-risk open colorectal cases; 77 were NSQIP reviewed and compared against 238 non-CINPT cases. CINPT patients were more likely to have a stoma (92% vs. 48%,  $p < 0.001$ ) and to be current or recent smokers within the last year (33% vs. 15%,  $p = 0.001$ ). Groups were similar with respect to obesity (40% vs. 48%,  $p = 0.294$ ), presence of contaminated or dirty wound (57% vs. 52%,  $p = 0.600$ ), use of preoperative steroids or immunosuppression (30% vs. 34%,  $p = 0.578$ ) and diabetes (18% vs. 25%,  $p = 0.278$ ). SSI rate was two-fold higher in non-CINPT patients (15%,  $N = 35/238$ ) as compared to CINPT patients (7%,  $N = 5/77$ ) though this did not reach significance on bivariate analysis ( $p = 0.075$ ). On multiple logistic regression analysis, CINPT was associated with decreased incidence of SSI (OR: 0.267; 95%CI: 0.092-0.777). Mean time to diagnosis of SSI was longer for CINPT patients as compared to non-CINPT (18 vs. 13 days postoperative;  $p = 0.01$ ).

**Conclusions/Discussion:** : In this cohort of patients at high-risk for SSI undergoing open colorectal surgery, CINPT was associated with a decreased incidence of SSI. SSI presented later in the setting of CINPT stressing the need for longer wound monitoring and surveillance. While larger, randomized studies are required to confirm these data, CINPT offers significant potential for quality improvement and SSI reduction.

#### EARLY SURGICAL INTERVENTION FOR ACUTE ULCERATIVE COLITIS IMPROVES OUTCOMES.

S18

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**Purpose/Background:** Modern immunotherapy is changing the treatment paradigm for ulcerative colitis including the timing of emergent surgical intervention for acute disease. The purpose of this study was to compare outcomes of early versus delayed emergency surgery for ulcerative colitis.

**Methods/Interventions:** An IRB-approved retrospective review of patients with the principal diagnosis of ulcerative colitis who were admitted and underwent non-elective abdominal surgery from 2008 to 2013 was performed using the National Inpatient Sample database. An "early" operation was defined as within 24 hours of admission during the work-week or within 48 hours of admission during the weekend. Analyses were weighted to represent the entire U.S. population. Postoperative complications, in-hospital mortality, length of hospital stay, and hospitalization costs were compared for those operated upon immediately versus with a delayed intervention. Multivariable logistic regression examined factors associated with postoperative outcomes and costs.

**Results/Outcome(s):** A total of 225,154 patients were admitted for ulcerative colitis, and 6,819 patients underwent emergency abdominal surgery (3.0%). 1,842 (27.0%) patients had early operations. Those intervened upon early were more likely to be male (58.6% vs. 51.9%,  $p = 0.024$ ) and from households with incomes higher than the national median (59.8% vs. 53.7%,  $p = 0.050$ ). Hospital classification and all comorbidity categories were similar between the early and delayed intervention groups. Early operation was associated with a lower complication rate (43.2% vs. 54.9%,  $p < 0.001$ ) and reduced lengths of hospital stays (75<sup>th</sup> percentile or greater, 21+ days; 8.2% vs. 28.6%,  $p < 0.001$ ). Complication categories less common in the early operation group included renal (8.4% vs. 14.3%,  $p < 0.001$ ), pulmonary (20.2% vs. 25.4%,  $p = 0.015$ ), and thromboembolic events (3.5% vs. 6.0%,  $p = 0.024$ ). Median total hospitalization costs were \$19,985 with an early operation versus \$34,258 with a delayed operation ( $p < 0.001$ ). There was no significant difference in mortality. Multivariable logistic regression demonstrated complication rates to be positively associated with increased age (OR = 1.43,  $p < 0.001$ ) and delayed operation (OR = 1.64,  $p < 0.001$ ). Extended lengths of stay were independently associated with increased age (OR = 1.14,  $p = 0.001$ ), male gender (OR = 1.36,  $p = 0.011$ ), and delayed operation (OR = 4.57,  $p < 0.001$ ). When accounting for additional days in the hospital, increased hospitalization costs (75<sup>th</sup> percentile or greater, \$47,515+) were independently associated with complications (OR = 1.41,  $p = 0.006$ ), and extended length of stay (OR = 5.75,  $p < 0.001$ ).

**Conclusions/Discussion:** Delayed operations for acute ulcerative colitis result in increased postoperative complications and increased lengths of stay which increased hospitalization costs. Thus, one should consider early surgical intervention for those patients admitted with severe acute ulcerative colitis.

## DIVERTING ILEOSTOMY: AN ALTERNATIVE TO EMERGENT COLECTOMY IN THE SETTING OF ACUTE MEDICALLY REFRACTORY IBD-RELATED COLITIS.

S19

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**Purpose/Background:** Severe, refractory colitis has traditionally been an indication for emergent colectomy in inflammatory bowel disease (IBD). Yet, many of these patients are at high risk for peri-operative complications due to their heightened inflammatory state and chronic nutritional deficiencies. We hypothesized that diverting loop ileostomy (DLI), a short and minimally-invasive procedure, may be a viable alternative to colectomy in these patients, providing the opportunity for colonic healing and patient optimization prior to more definitive surgical care.

**Methods/Interventions:** Thirty-six patients underwent DLI for severe, refractory colitis by a single colorectal surgeon at a single academic center from 10/2013-10/2016. Clinical data was abstracted from the medical record and the American College of Surgeons - National Surgical Quality Improvement Program (ACS-NSQIP) data. Our primary outcome was reoperation for any cause within 30 days. Secondary outcomes included: time to resolution of SIRS, time to tolerating oral diet, 30-day complication rates, and percentage of patients achieving any of 5 pre-set clinical aims. These aims included: avoiding emergent colectomy, discharge from the hospital prior to additional surgery, reducing need for immunosuppressive medications, improving oral intake and nutritional status, and allowing patients to undergo a single-stage, laparoscopic procedure at the time of their definitive operation.

**Results/Outcome(s):** Among 36 patients who underwent DLI, mean age was 36 years (range 16-81) and 47% were female. At the time of DLI, 17 patients (47%) carried a diagnosis of Crohn's Disease (CD), and 19 (53%) were diagnosed with ulcerative colitis (UC). All DLIs were performed via a single incision laparoscopic approach, with a median operative time of 60 minutes and a median postoperative length of stay of 5 days (range 2-20). Four patients (11.1%) underwent an additional operation within 30 days, including 2 emergent colectomies (1 due to disease progression and 1 due to acute appendicitis) and 2 definitive, restorative procedures (Table 1). Of 21 patients (59%) who met SIRS criteria at the time of operation, 13 (62%) resolved within 24 hours. Ninety-three percent of patients tolerated oral intake by postoperative day 1; median time to resuming a regular diet was 2 days. Five patients developed a postoperative complication within 30 days: 2 superficial surgical site infections (SSI), 1 deep space SSI, 1 hospital-associated pneumonia, 1 mild creatinine elevation. Fifteen of 17 patients with CD

achieved at least 3 of our pre-set clinical aims along with 17 of 19 patients with UC.

**Conclusions/Discussion:** DLI in the setting of severe, refractory colitis is a safe alternative to emergent colectomy. Patients undergoing DLI have acceptably low complication rates and most are afforded time for medical and nutritional optimization prior to proceeding with their definitive surgical care.

**Table 1. Patient Follow-Up by Surgical Procedures & DLI Aims**

Surgical Procedures To Date	Crohn's Disease (n=17)*		Ulcerative Colitis (n=19)*	
		%		%
DLI	17	100%	19	100%
DLI - Takedown	9	52.9%	15	78.9%
Colectomy + Hartmann's	2	11.8%	2	10.5%
Colectomy + IPAA or IRA	4	23.5%	12	63.2%
Ileostomy Takedown (definitive continuity)	2	11.8%	12	63.2%
<b>DLI Aims</b>				
Avoid emergent colectomy	17 / 17	100%	17 / 19	89.5%
Hospital discharge prior to IPAA or IRC	17 / 17	100%	18 / 19	94.7%
Reduction or elimination of immunosuppression	10 / 15	75.0%	15 / 19	78.9%
Improvement in nutrition	10 / 11	90.9%	15 / 19	78.9%
Able to have single stage, hand-assisted laparoscopic colectomy IPAA or IRA	4 / 5	80.0%	12 / 14	85.7%

IPAA: ileal pouch anal anastomosis, IRA: ileorectal anastomosis, \*: denominator varies based on available data or patient follow-up to date

## WHAT IS THE RISK OF ANASTOMOTIC LEAK FOLLOWING REPEAT INTESTINAL RESECTION IN PATIENTS WITH CROHN'S DISEASE?

S20

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**Purpose/Background:** To evaluate the increased risk of clinical anastomotic leak in patients with a history of prior intestinal resection undergoing repeat resection and anastomosis for Crohn's disease.

**Methods/Interventions:** We abstracted data from our prospectively collected departmental database at a tertiary care facility from July 2007 through March 2016. First, we identified a cohort of consecutive patients with Crohn's disease treated with intestinal resection and anastomosis. Patients with proximal fecal diversion were excluded. The cohort was divided into two groups: no prior resection compared to those with a history of prior resection. Next, we determined the presence of clinical anastomotic leak within 30 days of surgery and compared the risk of leak in the two groups. We evaluated covariates, including age, sex, preoperative serum albumin, and use of immune suppressing medications. Last, we determined statistical significance by  $\chi^2$  test for frequency and Pearson correlation analyses.

**Results/Outcome(s):** Of the 206 patients who met criteria, 83 patients had prior intestinal resection (40%). The two groups were similar in terms of age, sex, preoperative albumin, immune suppressing medication use, and procedure performed (Table). For those patients with prior resection, the most common procedures were ileocolic resections (83%) and small bowel resections (8%) with

a mean of 15±11 years between procedures. Overall, 21 clinical anastomotic leaks were identified (10% leak rate). There were 6 leaks (5%) detected in patients with no prior intestinal resection and 15 leaks (18%) detected in patients with a history of prior intestinal resection ( $p=0.004$ ). The odds ratio of anastomotic leak in Crohn's patients with prior resection compared to no prior resection was 4.3 (95% confidence interval: 1.6-11.6). Patients with one prior resection ( $n=53$ ) had leak rate of 15%, while patients with two or more prior resections ( $n=30$ ) had leak rate of 23%. The number of prior resections correlated with increasing risk for clinical anastomotic leak (correlation coefficient = 0.998).

**Conclusions/Discussion:** Patients undergoing repeat intestinal resection for Crohn's disease have a nearly 4-fold increase in anastomotic leak and represent a particularly high-risk population for this complication. The increased risk of leak is not explained by preoperative nutritional status or medication use and may thus reflect more aggressive disease biology, more complex surgery, or altered vascular supply. Targeted and novel anastomotic approaches are specifically needed to reduce the potential for clinical leak in this high-risk group of patients.

	No Prior Resection	Prior Resection	Significance (p-value)
# patients	123	83	
Age (years)	45.2±16.5	49.4±14.3	NS
Sex (female)	61.0%	57.8%	NS
Serum Albumin (g/dL)	3.6±0.6	3.3±0.7	NS
<b>Medications: (%)</b>			
Systemic steroids	39 (31.7%)	31 (37.3%)	NS
5-ASA/sulfasalazine	25 (20.3%)	4 (4.8%)	0.002
Immune modulators (6-MP, AZA, MTX)	19 (15.4%)	8 (9.6%)	NS
Anti-TNF agents	42 (32.5%)	19 (22.9%)	NS
<b>Procedure Performed: (%)</b>			
Ileocolic resection	87 (71%)	65 (78%)	0.03
Small bowel resection	9 (7%)	12 (14%)	
Right colectomy	10 (8%)	1 (1%)	
Total/ completion colectomy	10 (8%)	2 (2%)	
Left colectomy/sigmoid resection	7 (6%)	3 (4%)	

**Table:** Patient demographics. 5-ASA = 5-aminosalicylic acid, 6-MP = 6-mercaptopurine, AZA = azathioprine, MTX = methotrexate, TNF = tumor necrosis factor, NS = non significant

## KONO-S ANASTOMOSIS PREVENTS THE BOWEL PERISTALTIC DYSFUNCTION OF ANASTOMOTIC SITE IN RAT MODEL.

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**Purpose/Background:** In Crohn's disease (CD), the postoperative re-stenosis is one of the major problems after intestinal resection and anastomosis. Kono-S anastomosis drastically decreased the rate of re-stenosis in CD (*Dis Colon Rectum*. 2011). Although Kono-S anastomosis could be regarded as a subtype of side-to-side anastomosis with long incision of circular muscle, it is close to end-to-end anastomosis because of suture toward to short axis like Heineke-Mikulicz method. The aim of this study is to clarify the postoperative peristalsis and transport ability of Kono-S anastomosis focused on intestinal smooth muscle incision.

**Methods/Interventions:** Ascending colon was harvested by SD Rat (male 8week; Charles River). High-sensitivity pressure transducer was inserted in the lumen of colon. Condition setting was 1. Control, 2. Circular muscle incision and suture (CM), 3. Longitudinal muscle incision and suture (LM), 4. Kono-S surrogate model (after CM incision, suture toward short axis) (Each group:  $n=3$ ). Each model was set in the chamber filled with 98.6°F oxygenated Krebs buffer. The peristalsis conditions were taken by video camera for 30min. Peak frequency (PF), Peak pressure amplitude (PPA), Area under curve (AUC) are measured. Moreover, the transport time of beads was measured in each group.

**Results/Outcome(s):** 1. **Peristalsis:** CM group doesn't propagate the contraction wave across the suture point compared to Control group. On the other hand, LM and Kono-S model propagated more smoothly than CM group. (Shown as video image) 2. **Intraluminal pressure:** There were no differences in PF among each group. PPA, AUC were significantly decreased in CM group, however, in LM and Kono-S group PPA and AUC were significantly improved. (Fig.C; Control: CM: LM: Kono-S = 80.9: 40.7: 65.2: 66.9 mmHg, CM v.s Kono-S:  $p<0.05$ , AUC Control: CM: LM: Kono-S = 9402: 2853: 6283: 6928  $\text{mm}^2$  CM v.s Kono-S:  $p<0.05$ ) 3. **Transporting time:** transporting time of beads set in the lumen was shorter in Kono-S group than CM group and similar result between Kono-S and LM group. (Fig.D: Control: CM: LM: Kono-S = 20.0: 48.2: 30.6: 35.7min, CM v.s Kono-S:  $p<0.05$ )

**Conclusions/Discussion:** Those findings suggested that Kono-S anastomosis could preserve the functional bowel peristalsis with the complement of circular smooth muscle incision.

## MAJOR ABDOMINAL AND PERIANAL SURGERY IN CROHN'S DISEASE: LONG-TERM FOLLOW-UP AMONG AUSTRALIAN PATIENTS WITH CROHN'S DISEASE.

S22

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**Purpose/Background:** Most patients with Crohn's disease (CD) still require surgery despite significant advances in medical therapy, surveillance and management strategies.

**Methods/Interventions:** A specialist-referred cohort of CD from 1970 to 2009 was recruited and retrospectively reviewed. Surgery for CD was classified as major abdominal surgery or perianal surgery. The main outcomes of interest were the rates of major abdominal and perianal surgery between decades (1970-79, 1980-89, 1990-99, 2000-09), indications for surgery, types of procedure performed, the

S21

rate of elective and emergency surgery, risk of surgical recurrence and predictive factors for surgery.

**Results/Outcome(s):** A total of 972 consecutive patients with Crohn's disease were recruited from the 'Sydney IBD Cohort', a longitudinal cohort of inflammatory bowel disease patients with over 13061 year follow-up for CD. The main indication for surgery was stricture or obstruction (36%), followed by perianal disease (20%) and intra-abdominal fistulae/abscess (10%). Between 1970-2009, the overall risk of surgery within 5, 10 and 15 years of diagnosis was 31.7%, 43.3% and 48.4% respectively. The median time to first surgery from time of diagnosis was 2 years (range 0 - 31 years). 6.7% of initial surgeries within 5 years were classified as emergency operations. In total, 8.2% of patients with CD required emergency surgery within 15 years. The risk of surgical recurrence within 5, 10 and 15 years was 5.9%, 8.3% and 12.7% respectively. The rate of major abdominal surgery has significantly decreased between 2000-2009 when compared to the 1970-1979 period (odds ratio [OR], 0.35 CI 0.25 – 0.50). However, the rate of perianal surgery has significantly increased (OR 6.21 CI 2.61 – 14.75). The most common type of surgery was ileocolic resection or right hemicolectomy. Of the 972 patients over four decades, only eleven patients (1.1%) were diagnosed with colorectal cancer.

**Conclusions/Discussion:** The rate of major abdominal surgery has decreased. However, this has been associated with an increase in emergency surgery, and surgical recurrence rates have also trended higher, despite an overall reduction in major surgery. The early use of thiopurines and other immunomodulators may account for the decrease in major abdominal surgery in CD. The incidence of colorectal cancer in Crohn's disease is low (1.1%).

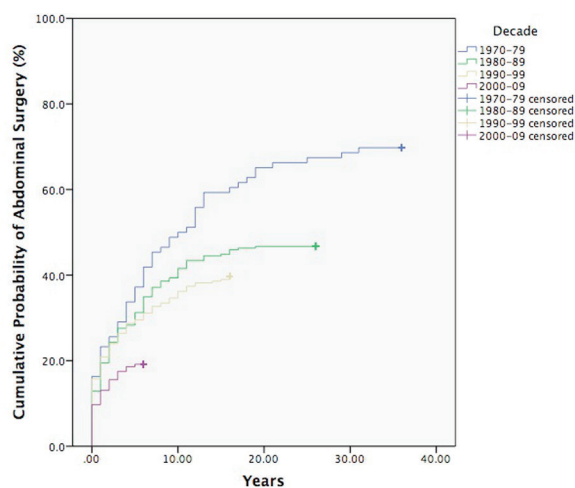


Figure 1. Rate of major abdominal surgery by decade of diagnosis

### THREE-DIMENSIONAL MODELLING FOR CROHN'S FISTULA-IN-ANO: A NOVEL, INTERACTIVE APPROACH.

S23

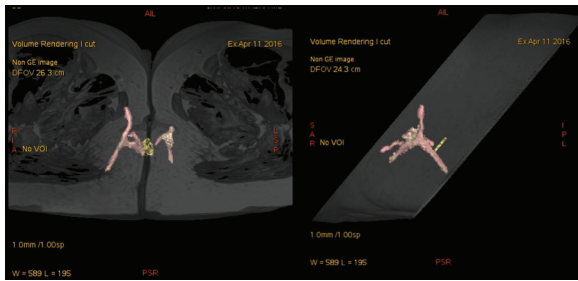
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**Purpose/Background:** Fistula-in-ano related to Crohn's disease has significant clinical sequelae including chronic discharge, abscess formation and tissue destruction from undrained sepsis. Pre-operative assessment of Crohn's fistulae with pelvic magnetic resonance imaging (MRI) allows clear delineation of the fistula tract anatomy; however, interpretation is fraught with difficulty for non-radiologists. We developed a novel three-dimensional (3D) modelling technique that accurately isolates fistula tracts and defines their relationship to the sphincter complex. The model allows rotation in multiple axes to improve spatial orientation for surgeons and aid intra-operative decision-making.

**Methods/Interventions:** An additional isometric 3D turbo-spin-echo T2-weighted imaging technique without fat suppression was used in our MRI protocol for all patients with Crohn's fistula from March 2016. Acquisition time was extended by six minutes compared to the standard 2D MRI protocol lasting twenty-five minutes. Selective seed growing segmentation, a semi-automatic process, of the fistula tract and volume rendering of the segmented tract were performed on the Advantage Workstation (General Electric). Volume rendering of the skin and anal canal was added to the final images, which were then further manipulated to resemble the orientation of the lithotomy position.

**Results/Outcome(s):** 28 patients with Crohn's fistula have received the modified pelvic MRI scan. Additional post-processing time to create the 3D model was approximately 15 minutes for each patient. We present three cases of Crohn's fistula using our 3D model in video form and compare this to conventional MRI imaging to highlight the clinical utility of the model.

**Conclusions/Discussion:** The addition of volumetric data from the modified MRI protocol allows much greater accuracy in isolation of fistula tracts for the purpose of 3D modelling; a technique which has not previously been described for fistula-in-ano. An intuitive, interactive 3D model has the potential to be an invaluable pre-operative tool for the colorectal surgeon, as well as enabling assessment of response to medical or surgical therapy.



The left-hand side image shows the fistula tracts in pink and the anal canal in yellow, in a modified axial plane to resemble the lithotomy position. The right-hand side image demonstrates the ability for the isolated fistula tracts to be rotated in multiple axes to improve spatial orientation.

### CROHN'S DISEASE OF THE POUCH: A TRUE DIAGNOSIS OR AN OVERSUBSCRIBED DIAGNOSIS OF EXCLUSION?

S24

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**Purpose/Background:** Restorative proctectomy (RPC) with ileal-pouch anal anastomosis (IPAA) is the procedure of choice for chronic ulcerative colitis (CUC). Following IPAA, up to 8% of CUC patients will later be diagnosed with Crohn's disease (CD) of the pouch, which is associated with an increased rate of fistula formation, pouch failure, and eventual excision. CD of the pouch remains poorly defined and notoriously difficult to treat. No study to date has reported the accuracy of diagnosing CD of the pouch, and the correlation of clinical diagnosis of CD of the pouch and pathologic confirmation in order to better understand which patients should be medically treated for CD of the pouch.

**Methods/Interventions:** Patients who had excision of IPAA with ileostomy (CPT code 45136) for a presumed clinical diagnosis of CD of the pouch were included. Data abstracted included preoperative, operative, postoperative, pathologic and radiographic variables. Descriptive statistics were used to describe this patient cohort.

**Results/Outcome(s):** Of the 147 patients who underwent pouch excision, 34 (23%) patients underwent excision for the indication 'CD of the pouch'. Patients were diagnosed with CD of the pouch based on a combination of clinical, radiographic, and endoscopic findings. Of these 34 patients, seven (21%) had surgical pathology consistent with CD at the time of pouch excision. There were no differences in diagnosis at time of colectomy, indication for colectomy, primary symptoms (equivalent pouchitis and fistulas), prepouch inflammation, ulceration of the pouch on endoscopy, or granulomas on biopsy at time of endoscopy (none with granulomas). Of the 27 patients without pathologic findings consistent with CD on surgical pathology, 41% (n=11) had an anastomotic leak at time of IPAA creation compared to 0% in the confirmed CD

group, and 89% (n=24) had symptoms of pouch dysfunction within 5 months of ileostomy reversal compared to the average of 13 months in the CD confirmed group. All patients without confirmed CD (n=27) were treated with antibiotics, 70% (n=19) with steroids, 59% (n=16) with immunomodulators, and 56% (n=15) with biologic therapy for a presumed diagnosis of CD; patients underwent an average of 3 operations for complications related to their pouch.

**Conclusions/Discussion:** A pathologic diagnosis of CD was given in only one fifth of patients who underwent pouch excision for presumed CD. Thus, the diagnosis of 'CD of the pouch' may be over ascribed. The large number of surgical and medical interventions used to treat the CD of the pouch may be futile if an inaccurate diagnosis, putting the patient at unnecessary risk. In the setting of a post IPAA leak or the onset of symptoms of less than six months, providers should be cautious in diagnosing the patient with CD and give further consideration to iatrogenic causes related to surgical complications.

### POUCH EXCISION AFTER RESTORATIVE PROCTOCOLECTOMY: INDICATIONS, COMPLICATIONS AND OUTCOMES.

S25

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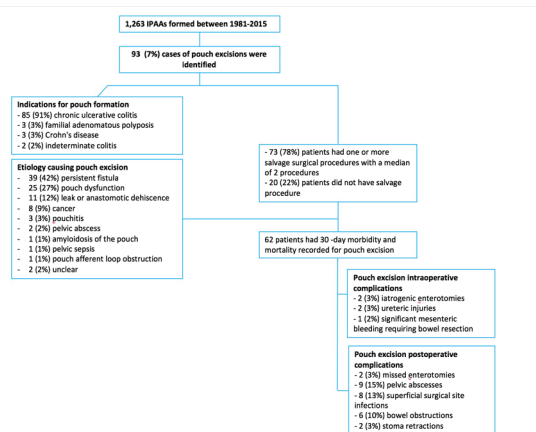
**Purpose/Background:** Ileoanal pouch failure occurs in 10% of patients after restorative proctocolectomy (RPC). A significant number of these patients require pouch excision despite multiple salvage operations sometimes including ileal diversion. Data concerning the indications for pouch excisions and its perioperative course are scarce. The aim of this study was to review pouch excisions, intraoperative and postoperative complications.

**Methods/Interventions:** This is a retrospective review of a single institution, single practice, prospectively maintained database. Charts of 1263 RPC patients with ileal pouch anal anastomosis (IPAA) performed between 1981 and 2015 were reviewed. Ninety-three (7%) cases of pouch excision were identified. Patients demographics, primary disease, reason for excisions, perioperative complications and outcomes were evaluated.

**Results/Outcome(s):** Indications for pouch surgery in these 93 patients were chronic ulcerative colitis (UC) in 85 (91%), familial adenomatous polyposis in 3 (3%), Crohn's disease in 3 (3%), and indeterminate colitis in 2 (2%). Surgical pathology of the excised pouch was available in 54 patients. In 5 patients originally diagnosed with UC, surgical pathology of the pouch after excision showed Crohn's disease. Among the 93 patients, 48 were female (52%), mean age was 45 years ( $\pm 13.4$ ), mean body mass index (BMI) was 23 ( $\pm 4.4$ ), and mean albumin was 3.6 mg/dl ( $\pm 0.6$ ). Mean time from pouch formation to

excision was 7.0 years ( $\pm$  6.7). Ten (11%) patients were taking steroids or other immunosuppressants at the time of pouch removal and 13 (14%) patients were smokers or ex-smokers. Seventy-three (78%) patients had at least one salvage surgical procedure prior to pouch excision. The indications for pouch excision were persistent fistula in 39 (42%), pouch dysfunction in 25 (27%), anastomotic leak or dehiscence in 11 (12%), cancer in 8 (9%), pouchitis in 3 (3%), pelvic abscess in 2 (2%), amyloidosis of the pouch in 1 (1%), pelvic sepsis in 1 (1%), pouch afferent loop obstruction in 1 (1%), and the indication was unclear in 2 (2%). Sixty-two patients had thirty-day morbidity and mortality recorded. Intraoperative complications were uncommon. Two patients had iatrogenic enterotomies which required bowel resection, two had ureteral injuries, and one had mesenteric bleeding which required bowel resection. Postoperative complications within 30 days included two missed enterotomies requiring reoperation, 9 pelvic abscesses, 8 superficial surgical site infections, 6 small bowel obstructions, and 2 stoma retractions. There was one death recorded.

**Conclusions/Discussion:** Pouch fistula or perianal sepsis is the most common indication for pouch excision. This procedure can be technically difficult with a significant number of complications. However, major intraoperative and postoperative complications are uncommon making pouch excision a feasible surgical intervention for pouch failure.



## IS EXTENDED VENOUS THROMBOEMBOLISM PROPHYLAXIS INDICATED FOLLOWING COLON SURGERY FOR INFLAMMATORY BOWEL DISEASE?

S26

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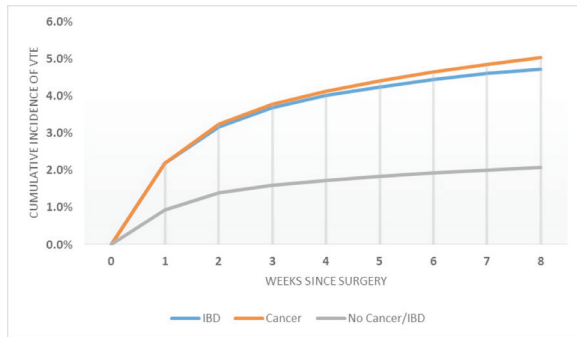
**Purpose/Background:** The risk of postoperative venous thromboembolism is believed to be high in patients with colon cancer and inflammatory bowel disease (IBD).

While the American Society of Colon and Rectal Surgeons clinical practice guideline suggest post-hospital prophylaxis after surgery in colon cancer patients, there are no recommendations for extended prophylaxis in patients with inflammatory bowel disease. Duration of post-hospital prophylaxis also remains unclear. In this study, we aim to analyze incidence of venous thromboembolism up to 8 weeks after colon surgery, and identify risk factors for postoperative venous thromboembolism.

**Methods/Interventions:** We performed a retrospective analysis of patients that underwent colon surgery using Explorys platform which provides aggregated electronic medical record data from 26 major integrated healthcare systems across the USA from 1999 to 2016. This new database provides longitudinal data, and captures events after discharge. A total of 514,340 patients had colectomies including 52,130 patients with colon cancer and 25,200 patients with inflammatory bowel disease. Patients were followed up to 8 weeks after surgery.

**Results/Outcome(s):** The overall incidence of VTE, DVT, PE within 4 weeks of colon surgery was 2.1%, 1.66%, 0.5% respectively. The overall incidence of VTE at 4 weeks from surgery increased from 0.3% (2001) to 3.0% (2011) and decreased to 2.2% (2015). The incidence of VTE is higher in patients with cancer (4.1%) and IBD (4.0%) compared with patients with other benign diseases (1.7%). The cumulative incidence of venous thromboembolism increases from 2.2% one week after surgery to 4.0% four weeks after surgery in patients with colon cancer. Similarly, the cumulative incidence of venous thromboembolism increases from 2.0% one week after surgery to 4.0% at four weeks postoperatively in patients with inflammatory bowel disease. The incidence of venous thromboembolism plateaus after 4 weeks. (Figure 1) On multivariate analysis, risk factors for VTE included IBD diagnosis, cancer diagnosis, age greater than 60, female gender, laparoscopy and BMI > 30. Increasing BMI was associated with a gradual increase in risk of VTE only among cancer patients but not in patients with IBD.

**Conclusions/Discussion:** The risk of venous thromboembolism is significantly higher in patients with colon cancer and inflammatory bowel disease compared to patients with other benign diseases after colon surgery. Patients are still at risk for venous thromboembolism up to 4 weeks after surgery. Extended pharmacologic prophylaxis for 4 weeks may be beneficial to not only those undergoing colon surgery for cancer but also those with a diagnosis of IBD, especially in patients having multiple risk factors. Guidelines may need to be updated to include this cohort.



### COLORECTAL SURGERY FELLOWSHIP IMPROVES IN-HOSPITAL MORTALITY AFTER COLECTOMY AND PROCTECTOMY IRRESPECTIVE OF HOSPITAL AND SURGEON VOLUME.

S27

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**Purpose/Background:** For the past 20 years, general surgery residents have increasingly pursued subspecialty training in colorectal surgery. However, the majority of operations performed by colorectal surgeons (CRS) are also performed by general surgeons. The aim of this study was to assess in-hospital mortality stratified by colorectal surgery training status after adjusting for surgeon and hospital volume.

**Methods/Interventions:** The Statewide Planning and Research Cooperative System database was used to identify all patients who underwent colectomy and proctectomy from January 1, 2000 to December 31, 2014. Operations performed by CRS were identified. The relationship between colorectal surgery training and in-hospital mortality was assessed using a multivariate logistic regression model adjusting for patient co-morbidities, annual hospital volume, and annual surgeon volume.

**Results/Outcome(s):** 270,684 patients underwent colectomy/proctectomy over the study period. 65,657 (24%) of operations were performed by CRS. Over the study period, the percentage of procedures performed by CRS increased from 14.9% in 2000 to 36.8% by 2014.

Patients who underwent a procedure by a CRS were more likely to be younger (62.5 vs. 64.4 years;  $p < 0.01$ ), have a Charlson co-morbidity index under 3 (67.8% vs. 63.0%,  $p < 0.01$ ) and were more likely to have had a laparoscopic operation (28.0% vs. 13.9%;  $p < 0.01$ ). CRS had higher volumes of these operations annually (7 cases per year for non-CRS vs. 38 for CRS,  $p < 0.01$ ). Without adjusting for volume, in-hospital mortality was significantly reduced for those undergoing colectomy/proctectomy by a CRS by 55% (OR 0.45, CI 0.41-0.51,  $p < 0.01$ ) regardless of the indication for surgery (Table 1). After adjusting for hospital and surgeon volume, the risk of inpatient mortality after colectomy/proctectomy for those operated on by CRS weakened to 0.73 (CI 0.63-0.84,  $p < 0.01$ ). Therefore, hospital and surgeon volume account for 51% of the reduction in in-hospital mortality when colorectal surgeons perform colectomy/proctectomy.

**Conclusions/Discussion:** For patients undergoing colectomy or proctectomy, risk-adjusted in-hospital mortality decreased when the operation was performed by a CRS even after accounting for hospital and surgeon volume. CRS overall had higher annual operative volume of colectomy and proctectomy than general surgeons; however this did not account for the mortality benefit alone.

### IS THE DISTANCE WORTH IT? RECTAL CANCER PATIENTS TRAVELING TO HIGH-VOLUME CENTERS SEE IMPROVED OUTCOMES.

S28

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**Purpose/Background:** There are advantages to receiving rectal cancer treatment locally, including reduced travel burden, closer support system, remaining in-network for insurance, and familiarity with local medical systems. The aim of this study was to determine if operative volume outweighs the advantages of being treated locally by comparing the outcomes of rectal cancer patients treated at local, low-volume centers versus those who traveled to high-volume centers.

S27 Table 1: Indications for Operation

Indications for Operation	Not-CRS	CRS	P-Value
Ischemia	90.3%	9.7%	<.01
Perforation	90.8%	9.2%	<.01
Cancer	72.5%	27.5%	<.01
Diverticulitis	71.1%	28.9%	<.01
IBD	61.1%	38.9%	<.01
Prolapse	33.5%	66.5%	<.01



**Methods/Interventions:** The 2006-2012 National Cancer Data Base was queried for clinical stage II-III rectal cancer patients who underwent resections. Rectal cancer resection volume was calculated as the average annual proctectomy rate at individual institutions and distance traveled was defined as the direct linear distance between the patient's zip code and the hospital's address. These two variables were then divided into quartiles. Patients who traveled a short distance to a low-volume institution (SD/LV) were defined as being in the first quartile for both

volume and distance. Patients who traveled a long distance to a high-volume institution (LD/HV) were defined as being in the 4<sup>th</sup> quartile for both volume and distance. These two groups were used for comparison. A mixed-effects analysis assessed the effect of the distance/volume relationship on 6 different outcomes: margins, lymph node yield, receipt of adjuvant chemotherapy, readmission within 30-days, and 30- and 90-day mortality.

**Results/Outcome(s):** A total of 19,548 patients met inclusion criteria. 2,150 patients fell in the LD/HV group

### S28 Patient and Hospital Characteristics

Variable	Long Distance/High Volume N=2150 (%)	Short Distance/Low Volume N=1446 (%)
Age (Median) (IQR)	59 (51-68)	63 (54-73)
Race		
White	1909 (88.8)	1135 (78.5)
Black	106 (4.9)	149 (10.3)
Hispanic	73 (3.4)	99 (6.8)
Other	62 (2.9)	62 (4.4)
Insurance		
Medicaid	108 (5.0)	128 (8.8)
Medicare	754 (35.1)	627 (43.4)
Other Gov't	44 (2.1)	8 (0.6)
Private	1166 (54.2)	614 (42.5)
Uninsured	78 (3.6)	69 (4.8)
Median Income		
<38,000	586 (27.3)	241 (16.7)
38,000-47,999	644 (30.0)	427 (29.5)
48,000-62,999	538 (25.0)	388 (26.8)
>63,000	382 (17.8)	390 (27.0)
Year of Diagnosis		
2006	205 (9.5)	121 (8.4)
2007	247 (11.5)	146 (10.1)
2008	262 (12.2)	222 (15.3)
2009	341 (15.9)	195 (13.5)
2010	359 (16.7)	238 (16.5)
2011	351 (16.3)	256 (17.7)
2012	385 (17.9)	268 (18.5)
Clinical Stage III	1163 (54.1)	702 (48.6)
Received Neoadjuvant Radiation	1822 (84.7)	1028 (71.1)
Academic Hospital	1604 (74.6)	185 (12.8)
Hospital Location		
New England	39 (1.3)	146 (10.1)
Mid-Atlantic	253 (11.8)	238 (16.5)
South Atlantic	584 (27.2)	249 (17.2)
EN Central	292 (13.6)	369 (25.5)
ES Central	232 (10.8)	47 (3.3)
WN Central	323 (15.0)	103 (7.1)
WS Central	169 (7.9)	86 (5.9)
Mountain	95 (4.4)	46 (3.2)
Pacific	173 (4.4)	162 (11.2)

and 1,446 fell in the SD/LV group. The mean travel distance was 112.9 miles for the LD/HV group and 2.3 miles for the SD/LV group. Patients who were younger, white, privately insured, lower income, stage III, and received neoadjuvant radiation were more likely to have traveled to a high-volume center. There was also wide variation in travel by geographical region with the highest proportion of long distance travel occurring in the South Atlantic region and the lowest proportion in New England. When controlled for patient factors, stage, receipt of neoadjuvant therapy, and hospital factors, patients in the SD/LV group had higher odds of having a positive margin (OR=4.31, 95%CI=1.54,11.98), a lymph node yield of <12 (OR=2.95, 95%CI=2.01,4.25) and 30- (OR=4.56, 95%CI=1.33,14.55) and 90-day mortality (OR=4.65, 95%CI=1.53,17.01) compared to those in the LD/HV group.

**Conclusions/Discussion:** Our results indicate that when controlled for patient, tumor, and hospital factors, patients who traveled a long distance to a high-volume center had improved margins, lymph node yield, and 30- and 90-day mortality compared to those who traveled a short distance to a low-volume center. These findings suggest that improved outcomes in rectal cancer patients may be achieved through accreditation programs such as the National Accreditation Program for Rectal Cancer to improve overall quality of care.

### LONG-TERM FUNCTIONAL OUTCOMES AFTER RECTAL SURGERY: RESULTS FROM THE PROFILES REGISTRY.

S29

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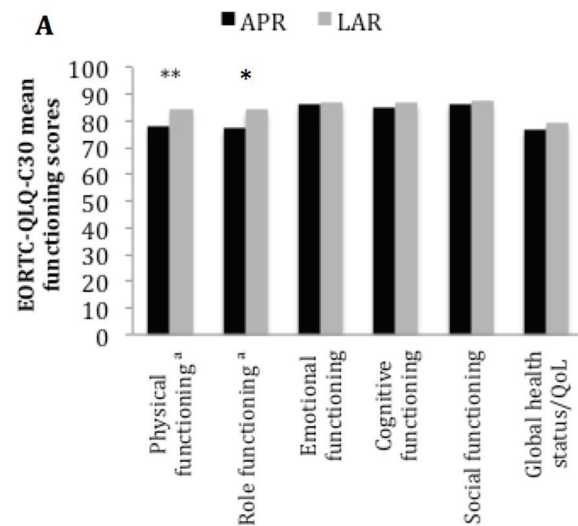
**Purpose/Background:** This study aimed to evaluate the effects of rectal surgery on functional outcomes such as QoL and physical activity, by analysing the differences between sphincter-preserving (LAR) surgery and abdomino-perineal resection (APR) among 1-11-year rectal cancer survivors.

**Methods/Interventions:** Individuals diagnosed with rectal cancer between 2000-2009 as registered by the population-based Eindhoven Cancer Registry were included. Survivors completed questionnaires on QoL (EORTC QLQ-C30), disease-specific health status (EORTC QLQ-CR38), and physical activity in 2010, 2011 and 2012.

**Results/Outcome(s):** Response rate of rectal cancer survivors was 75% (N=1,017) and in this group 632 patients had undergone a LAR, while 273 had undergone an APR. Compared to APR patients, LAR patients had undergone preoperative radiotherapy less often (94% vs. 75%). There were no differences in clinical characteristics

and comorbid conditions between the LAR and APR group. No significant differences were found in physical activity between patients who had undergone an APR vs. LAR. Patients who had undergone an APR did report worse physical functioning ( $p=0.009$ ) and role functioning ( $p=0.03$ ), a worse body image ( $p=0.001$ ), a higher financial impact ( $p=0.04$ ), more insomnia ( $p=0.03$ ) and male sexual problems ( $p=0.03$ ) compared with patients who had undergone a LAR. Also, they reported less constipation ( $p=0.02$ ) and gastrointestinal problems ( $p=0.009$ ). Subanalyses comparing patients who had undergone an APR versus patients who had undergone a LAR with permanent colostomy showed no significant difference in physical activity and physical functioning. However, APR patients reported a better body image ( $p=0.048$ ), future perspective ( $p=0.048$ ) and less nausea/vomiting ( $p=0.03$ ) and stoma-related problems ( $p=0.001$ ) compared to patients who had undergone a LAR with permanent colostomy.

**Conclusions/Discussion:** The primary aim of this retrospective analysis of over 1,000 rectal cancer survivors was to evaluate physical activity and functioning after surgery involving the pelvic floor. These data showed no differences in self-reported physical activity in patients who had undergone an APR versus a LAR. However, based on outcomes of the EORTC QLQ-C30 questionnaire, physical functioning seems to be worse in the APR patients. This could mean that a more comprehensive pelvic dissection has a negative effect on physical functioning after rectal surgery.



### QUALITY OF LOCAL EXCISION FOR RECTAL NEOPLASMS USING TRANSANAL ENDOSCOPIC MICROSURGERY VERSUS TRANSANAL MINIMALLY INVASIVE SURGERY: A MULTI-INSTITUTIONAL COARSENEDED EXACT MATCHED ANALYSIS.

S30

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**Purpose/Background:** Local excision using an advanced operating platform for endoscopically unresectable rectal polyps and early rectal cancer is superior to traditional transanal excision, but there are no data comparing the quality of excision using transanal endoscopic microsurgery (TEM) and transanal minimally invasive surgery (TAMIS). The objective of this study is to compare the incidence of tumor fragmentation and positive margins for patients undergoing local excision of benign and malignant rectal neoplasms using TEM versus TAMIS.

**Methods/Interventions:** Retrospective data from two high-volume tertiary care centers were collected for all adult patients undergoing full-thickness curative intent local excision using TEM or TAMIS for benign or malignant (clinical T1N0 only) rectal neoplasms. All defects were closed. Patients undergoing palliative local excision (i.e. clinical T2+, N1-2, or M1), partial-thickness excision, and those who received preoperative radiotherapy were excluded from the analysis. TEM and TAMIS cases were matched based on maximum diameter of the defect, lesion height, location within the rectal lumen, and the indication for local excision (benign versus malignant) using coarsened exact matching. The main outcome measure was the incidence of tumor fragmentation and positive margins.

**Results/Outcome(s):** A total of 303 patients were eligible for this study, of which 233 were matched and included (128 TEM and 105 TAMIS). Mean age was 65.0 years (SD 13.5) and 62% were male. There were no differences in lesion size (TEM 2.9 cm (SD 1.4) vs. TAMIS 2.8 cm (SD 1.4),  $p=0.403$ ), lesion height (6.5 cm (SD 1.9) vs. 6.5 cm (SD 2.4),  $p=0.795$ ), benign pathology (45% vs. 54%,  $p=0.173$ ), and anteriorly located lesions (14% vs. 15%,  $p=0.800$ ) between two groups after matching. Operating time was longer in the TEM group (81 min (SD 33) vs. 71 min (SD 38),  $p=0.048$ ). Peritoneal violation occurred in 7% (1/14) of TEM and 5% (1/20) of TAMIS for lesions located anteriorly and >7cm from the anal version ( $p=0.794$ ), and all cases were closed endoluminally. There were no differences in the incidence of tumor fragmentation (TEM 3% vs. TAMIS 6%,  $p=0.184$ ) or positive margins (2% vs. 4%,  $p=0.514$ ). Postoperative complications were also similar (TEM 8% vs. TAMIS 9%,  $p=0.833$ ), including clinically significant bleeding (2% vs. 3%,  $p=0.806$ ) and abscess formation (1% vs. 2%,  $p=0.462$ ). Only 1 patient required a Hartman's procedure

for a delayed perforation (in the TEM group). Salvage radical surgery was performed in 3% (8/233) overall for unfavourable histology (4/233) and T2+ tumors (4/233).

**Conclusions/Discussion:** High quality local excision for benign and rectal neoplasms can be equally achieved using TEM or TAMIS. The choice of operating platform for local excisions of rectal neoplasms should be based on surgeon preference, availability, and cost.

### DOES THE ADDITION OF A STOMA DELAY DISCHARGE IN PATIENTS TREATED IN AN ENHANCED RECOVERY AFTER SURGERY (ERAS) PATHWAY?

S31

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**Purpose/Background:** Implementation of ERAS pathways have been shown to improve recovery and decrease length of stay in patients undergoing colorectal surgery. The objective of this review was to assess whether the benefits of an ERAS pathway are diminished in patients requiring a stoma.

**Methods/Interventions:** All patients having colorectal surgery at 15 academic hospitals in Ontario were enrolled in a government-supported ERAS implementation program. Outcome data and compliance with ERAS recommendations were collected prospectively. Patients who had a permanent or temporary colostomy or ileostomy were included in the "stoma" group while all others were in the "no stoma" group.

**Results/Outcome(s):** Between September 2012 and April 2015, 2,876 patients (48% female; mean age 60) were enrolled. Of these, 930 (32.3%) had a stoma. Patients who had a stoma were more likely to have a rectal (58.1% vs 12.3%) or combined colorectal resection (21.6% vs 1.7%) than a colonic procedure (18.8% vs 82.1%) ( $p<0.001$ ). Patients with a stoma were more likely to have open surgery (59.5 vs 27.3) and less likely to have a laparoscopic procedure (33.6% vs 62.0%) ( $p<0.001$ ). There were significant differences in compliance with 10 of the 14 guideline recommendations. With respect to complications, patients with a stoma were significantly more likely to have an ileus (25.4% vs 16.5%,  $p<0.001$ ) and surgical site infection (12.4% vs 6.9%,  $p<0.001$ ) and their LOS was significantly longer (mean 8.7 days vs 6.1 days, 95%CI 2.04-3.10,  $p<0.001$ ). Additionally, patients with a stoma were more likely to visit the emergency room (14.7% vs 10.2%,  $p<0.001$ ) and be readmitted to hospital (12.0% vs 6.3%,  $p<0.001$ ) within 30 days of surgery (table two).

**Conclusions/Discussion:** Patients who receive a stoma have lower compliance with ERAS recommendations and are more likely to develop ileus and surgical site infection. As well, patients with a stoma have a longer length of stay,

more emergency room visits and readmissions. Further study is required to understand whether non-compliance with guideline recommendations results in the longer LOS or alternately, bowel function is slower to return and leads to decreased compliance with guideline recommendations and longer LOS.

Table 2. Multivariable regressions examining association with increased length of stay and ileus as a function of stoma adjusting for other factors

Factor	LOS		Ileus	
	RR (95% CI)	p-value	RR (95% CI)	p-value
Stoma	1.15 (1.06 to 1.25)	0.001	1.16 (0.89 to 1.52)	0.27
Laparoscopic vs open/conv	0.72 (0.67 to 0.77)	<0.001	0.57 (0.48 to 0.69)	<0.001
Procedure				
- Rectal	1.00 (Ref)		1.00 (Ref)	
- Colon	0.92 (0.84 to 1.01)	0.085	1.03 (0.82 to 1.28)	0.82
- Both	1.06 (1.00 to 1.14)	0.060	1.32 (0.93 to 1.87)	0.12
Compliance with:				
Pre-op recommendations	0.92 (0.79 to 1.07)	0.27	1.11 (0.89 to 1.37)	0.36
Intra-op recommendations	0.96 (0.90 to 1.02)	0.21	1.00 (0.85 to 1.18)	0.98
Post-op recommendations	0.74 (0.72 to 0.77)	<0.001	0.65 (0.49 to 0.86)	0.002
Male	1.06 (0.99 to 1.12)	0.074	1.45 (1.17 to 1.80)	0.001
Age	1.01 (1.00 to 1.01)	<0.001	1.00 (1.00 to 1.01)	0.033
Diagnosis				
- Cancer	1.00 (Ref)		1.00 (Ref)	
- IBD	1.03 (0.98 to 1.09)	0.27	0.96 (0.82 to 1.12)	0.60
- Other	1.12 (0.94 to 1.34)	0.22	0.80 (0.62 to 1.03)	0.090

\* RR represents the relative risk of either increased days of length of stay, or separately, ileus. Estimates derived from a multivariable generalized estimating equation model (LOS: Negative binomial; Ileus: log-binomial).

### PATIENT SATISFACTION WITH PROPOFOL FOR OUTPATIENT COLONOSCOPY: A PROSPECTIVE, RANDOMIZED, DOUBLE-BLIND STUDY.

S32

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**Purpose/Background:** Patient satisfaction is an important metric for reimbursement with current changes in healthcare. Colonoscopies comprise a large proportion of cases at outpatient centers for which Propofol is considered an ideal anesthetic. However, there is a paucity of information regarding patient satisfaction with Propofol. Objective : Evaluate patient satisfaction with Propofol compared to non-Propofol (Fentanyl/Midazolam) anesthesia for outpatient colonoscopies at an Ambulatory Surgery Center. Safety and complications were secondary end points.

**Methods/Interventions:** 300 patients each in Propofol and Fentanyl/Midazolam groups were enrolled in a prospective, randomized, double-blind study (NCT 02937506). All patients scheduled to undergo colonoscopies at the outpatient center were offered the study and randomized after informed consent was obtained. Patients who were not candidates for having their procedure at the center were excluded from the study. A single endoscopist performed all colonoscopies. The endoscopist and patients were blinded to the medication received. Data were collected

on the day of endoscopy by the nursing staff. The sub-investigator was blinded to the randomization and called patients after 24 hours to collect post-discharge data. Data sets were combined for analysis.

**Results/Outcome(s):** Fewer Propofol patients remembered being awake (2% vs, 17% for Fentanyl) and were more likely to rate the amount of anesthesia received as being “just right” (98.7% vs. 91.3%) and state that they were “very satisfied” with their anesthesia (86.3% vs. 74%). More propofol patients were likely to recommend their anesthesia to others (98.7% vs. 94%; p=0.0037). 26% of Fentanyl procedures were rated “difficult” compared to 4.7% for Propofol (p<0.0001) and complications were less in the Propofol group (2.7% vs. 11.7%, p<0.0001).

**Conclusions/Discussion:** Patients prefer Propofol over a combination of Fentanyl/Midazolam as their anesthetic for outpatient colonoscopies. Propofol appears to be superior to Fentanyl/Midazolam for outpatient colonoscopy. Limitation: The endoscopist could not be completely blinded to the anesthetic administered and hence did not participate in any data collection.

### THE EFFECT OF INTRAPERITONEAL LOCAL ANESTHETIC ON FUNCTIONAL POSTOPERATIVE RECOVERY FOLLOWING LAPAROSCOPIC COLECTOMY: A RANDOMIZED CONTROLLED TRIAL.

S33

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**Purpose/Background:** Intraperitoneal local anaesthetic (IPLA) is a new analgesic technique for inclusion in the polypharmacy approach to postoperative pain management in enhanced-recovery-after-surgery (ERAS) programs. IPLA is safe and has been shown to reduce both postoperative pain and nausea following open colectomy, in the setting of epidural anaesthesia. The mechanism of action is proposed to be transient interruption of vagal autonomic afferents to the brain stem centres that normally modulate the surgical stress response and postoperative pain. This study determines whether there is a role for IPLA in patients undergoing laparoscopic colectomy in the setting of general anaesthesia.

**Methods/Interventions:** Multi-site, double-blinded, randomized, placebo-controlled trial design (ClinicalTrials.gov Identifier NCT02449720). Adults undergoing laparoscopic colectomy received either instillation of 100mg intraperitoneal ropivacaine both before dissection and prior to abdominal closure and a continuous postoperative infusion of 20mg/hr ropivacaine for 48hrs (IPLA group), or a normal saline equivalent (Control Group). A standardised ERAS program and anaesthetic protocol was used in perioperative care. Participant demographic and baseline

characteristic data were collected. Functional postoperative recovery data was obtained using the previously validated surgical-recovery-scale (SRS). Postoperative pain was recorded using a visual-analogue-scale (VAS), and opioid consumption, recovery of bowel function, time-to-readiness-for-discharge (TRD), and complications were recorded. Participants were followed up for 45 days.

**Results/Outcome(s):** Fifty-one participants were recruited to this study. The IPLA (n=26) and placebo (n=25) groups were equal in demographics, baseline characteristics, adherence to anaesthetic protocol, and complication rate. The IPLA group reported an improved SRS at day 7, 30 and 45 (P=0.01) post operation compared with control, with a return to preoperative scores around day 7. Pain was lower in the IPLA group for the duration of the intraperitoneal infusion. Neither the opioid consumption, recovery of bowel function or TRD were different between groups.

**Conclusions/Discussion:** Instillation and infusion of intraperitoneal ropivacaine for patients undergoing laparoscopic colectomy decreases postoperative pain and improves functional postoperative recovery, consistent with the surgical stress theory. We recommend routine inclusion of IPLA into the multimodal analgesia component of ERAS programs for laparoscopic colectomy. The impact of IPLA on the recovery of bowel function should be evaluated in a larger cohort of patients.

### LONG-TERM DELETERIOUS IMPACT OF SURGEON CARE FRAGMENTATION AFTER COLORECTAL SURGERY ON SURVIVAL: CONTINUITY OF CARE CONTINUES TO COUNT.

S34

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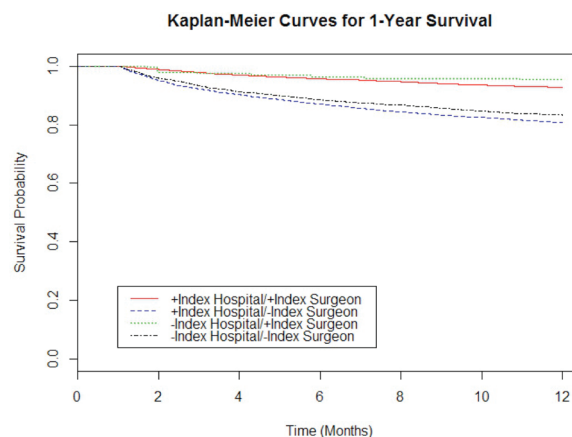
**Purpose/Background:** Readmission surgical care fragmentation is the lack of continuity of care upon readmission after surgery whereby continuity depends on both the care of the index hospital where the original surgery occurred and the index surgeon who performed the original surgery. Previous studies suggest that readmission to the index hospital is associated with decreased short-term mortality which is greatest for patients readmitted for surgical complications, especially when the index surgeon manages the readmission. Yet, there is paucity of literature evaluating the role of readmission surgical care fragmentation and long-term outcomes. The aim of this study was to examine the association between readmission surgical care fragmentation and survival.

**Methods/Interventions:** New York's Statewide Planning and Research Cooperative System was queried for unscheduled readmissions within 30 days of discharge from colectomy or proctectomy (2004-2014) and classified

as readmission to the index hospital by index surgeon (+IH/+IS), index hospital by another provider (+IH/-IS), another hospital by the index surgeon (-IH/+IS), and another hospital by another provider (-IH/-IS). We fit a multi-level cox model and competing risk cox models to evaluate one-year overall-survival and colorectal-cancer-specific survival, respectively, amongst these groups. All models adjusted for patient, index-hospital and index-surgeon characteristics.

**Results/Outcome(s):** Among 166,198 proctectomy or colectomy patients, 96% were discharged alive, and 12% had an unscheduled readmission of which 1,349 died within 30 days of readmission and were excluded from this survival analysis. 41% were readmitted to +IH/+IS, 46% to +IH/-IS, 1% to -IH/+IS, and 12% to -IH/-IS. Overall survival by readmission type is shown in the Kaplan-Meier graph, median follow-up time was 3.6 years. After adjusting for potential confounders, readmission to +IH/+IS was associated with increased survival, with patients readmitted to +IH/-IS (Hazard Ratio [HR] 1.73, 95% Confidence Interval [CI] 1.63-1.84) and -IH/-IS (HR 1.61, CI 1.47-1.74) having worse one-year overall survival. Colorectal cancer specific one-year survival paralleled overall survival with +IH/-IS having a HR of 1.74 (CI 1.45-2.08) and -IH/-IS a HR 1.56 (CI 1.22-1.99).

**Conclusions/Discussion:** Readmission to non-index surgeon was associated with worse long-term survival. Policies improving surgical continuity of care may improve survivorship after colorectal surgery.



### PROPHYLACTIC URETERAL STENTING FOR COLECTOMY: AN ANALYSIS OF NSQIP AND PREMIER DATASETS.

S35

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**Purpose/Background:** Despite improvement in technique and technology, prophylactic ureteral stenting to avoid iatrogenic ureteral injury (UI) during colectomy

remains controversial. The aim of this study was to determine rate of UI with and without stent placement, evaluate outcomes attributable to ureteral stent placement, and determine costs associated with prophylactic stenting.

**Methods/Interventions:** An analysis of the 2012-2014 Colectomy-Targeted American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) database was performed. Following univariate analysis, multivariate analysis (MVA) models were constructed to determine independent effectors on UI and urinary tract infection (UTI). The Premier Colectomy Database was used to compare cost data between stent and non-stent groups.

**Results/Outcome(s):** 59,641 colectomy patients were identified with a mean age of  $61.2 \pm 15.1$  years and BMI of  $28.3 \text{ k/m}^2$ . 10.0% ( $n=5,982$ ) of colectomies were performed with prophylactic ureteral stent placement (PUSP). A total of 348 (0.58%) UI were identified. Colon cancer was the most common indication for colectomy (34.4%,  $n=20,536$ ). PUSP was most commonly used in colectomies for diverticular disease (45.3%;  $n=2,710$ ), with UI also occurring most during colectomies for diverticular disease (37.1%,  $n=129$ ). No clinically significant differences were seen between non-stent and stent groups, including rates of preoperative UTI (0.36% vs 0.50%;  $p=0.09$ ). Operative time was longer with PUSP (242.2 vs 165.7 minutes;  $p<0.0001$ ). On MVA, PUSP was associated with lower rates of UI (OR 0.591; 95% 0.414 to 0.843). On univariate analysis, patients receiving stents demonstrated higher postoperative UTI rates (3.3% vs 2.6%;  $p=0.0018$ ), higher readmission rates (11.02% vs 10.09%;  $p=0.02$ ), and higher rates of UTI as the indication for readmission (3.2% vs 1.6%;  $p<0.007$ ). However, following MVA, ureteral stenting was not associated with postoperative UTI (OR 1.07; 95%CI 0.88 to 1.30), but was associated with UTI as indication for readmission (OR 2.05; 95%CI 1.07-3.93). Utilizing the Carolinas HealthCare System-specific Premier Database, 4,535 colectomies were identified and 237 were performed with PUSP. In-patient hospital charges were significantly higher in the PUSP cohort ( $\$26,972 \pm \$19,023$  vs  $\$22,502 \pm \$19,278$ ;  $p<0.0001$ ).

**Conclusions/Discussion:** In this analysis, PUSP was utilized in 10% of colectomies; most commonly for diverticulitis. UI was a rare complication of colectomy, with or without PUSP. When controlling for appropriate factors, PUSP was associated with a lower rate of UI in colectomy. The trade-off for lower rate of UI is higher rate of UTI as reason for readmission and higher cost. As such, further research is needed to delineate which patient populations most clearly benefit from PUSP.

## PERCEPTION OF PATIENTS AND DIAGNOSTIC ACCURACY OF DYNAMIC MAGNETIC RESONANCE IMAGING IN THE STUDY OF PELVIC FLOOR DISORDERS: IN SEARCH OF THE EVIDENCE.

S36

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**Purpose/Background:** The aim is to conduct a diagnostic accuracy study evaluating the use of dynamic magnetic resonance imaging in the study of pelvic floor disorders and conducting a patient satisfaction study when compared to the currently considered reference test which is the videodefecography.

**Methods/Interventions:** Patients were those who received a diagnosis of pelvic floor disorder and were referred to the colorectal surgery clinic in a consecutive serie. Patient selection was based on Rome III criteria. Patients with slow transit constipation or irritable bowel syndrome, or those who refused testing were excluded. A clinical history and abdominopelvic examination was carried out during consultation by certified colorectal surgeons. This was followed by a consistent defecography protocol in the sitting position by a gastroenterologist specializing in defecography. Dynamic magnetic resonance imaging was carried out using a similar intrarectal contrast material in the supine position by an experienced radiologist. All patients underwent both imaging tests (videodefecography and dynamic magnetic resonance imaging) in the same order. Once the assessment process was completed, a satisfaction survey was administered to the patients in the clinic with the aim of comparing the comfort between both tests. All the assessors were blinded to the results of the other exams. The sensitivity, specificity, positive predictive value, and negative predictive value were evaluated. We developed a statistical agreement analysis for each finding of pelvic floor disorder.

**Results/Outcome(s):** 40 patients with a Rome III diagnostic criteria were involved. The defecation maneuver was simulated in all cases in both tests satisfactorily. Magnetic resonance imaging showed a sensitivity greater than 90% in cases of anismus, rectocele, enterocele, rectal prolapse and pelvic laxity. Specificity was greater than 80% in all findings by dynamic magnetic resonance imaging except for the pelvic laxity. The degree of agreement between the two tests for the different findings of pelvic floor disorders are summarized in Table 1. Furthermore, 18 cystoceles and 11 colpoceles were diagnosed only by dynamic magnetic resonance imaging. The most uncomfortable test was the videodefecography in 54% of cases, and the most common reason was embarrassment, which was stated by 16 (76%) individuals.

**Conclusions/Discussion:** In addition to offering advantages such as a high definition pelvic evaluation as a unit

without ionizing radiation, dynamic magnetic resonance imaging is better tolerated than videofecography by almost patients when they undergo a pelvic floor study. The evaluation of pelvic floor disorders using dynamic resonance shows a good diagnostic accuracy for each finding and an acceptable degree of global agreement with the gold standard test.

### FULL-THICKNESS NEORECTAL PROLAPSE AFTER TATME AND TRANSANAL TRANSABDOMINAL PROCTOSIGMOIDECTOMY FOR LOW RECTAL CANCER.

S37

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**Purpose/Background:** Intersphincteric resection has been performed as an alternative to abdominoperineal resection (APR) for low rectal cancer. Neorectal prolapse is a late complication and has been known to cause frequent defecation and incontinence. This complication has been described rarely, and, consequently, no effective treatment has been recommended. The objective of this study is to report the incidence, management and outcomes in our population.

**Methods/Interventions:** From a prospectively maintained database of 1,093 rectal cancers treated from 1984 to 2016, a review was performed to identify all patients with low rectal cancer whom underwent curative sphincter-preserving surgery by TATA or taTME. Data regarding the incidence, management, and outcomes of neorectal prolapse were analyzed.

**Results/Outcome(s):** 409 patients were identified; 185 underwent open TATA with coloanal anastomosis and 224 underwent minimally invasive TATA (robotic, laparoscopic, or taTME). All patients received neoadjuvant chemoradiation with a mean radiation dose of 4,990 cGy (4,480–5,257 cGy). Overall neorectal prolapse occurred in 4.64% of patients (N=19). Prolapse incidence was 2.2% in the open group and 6.7% in the MIS group (p=0.023) with no difference between laparoscopic (6.4%) vs robotic

(5.8%) vs taTME (8%). We found no statistically significant difference in the time from surgery to diagnosis of the prolapse between the groups (p=0.289). 21.0% of patients were diagnosed within 6 months of surgery, 42.1% between 7 and 12 months, and 36.8% over a year after surgery. Incidence of prolapse was higher in women (9.5%) than men (2.5%) (p=0.011). There were no differences in local recurrence (LR) rates between the neorectal prolapse group (5.3%) when comparing them with our population without prolapse (3.4%) (p=0.79). No significant difference in the incidence of neorectal prolapse regarding the level of the tumor, pathologic T stage or BMI was observed. Of the 19 patients who developed a neorectal prolapse, 1 underwent Duhamel mucosal excision, 13 transanal redo of coloanal anastomosis, 3 transanal redo of coloanal anastomosis + levatorplasty, and 2 did not receive surgical treatment. No patient was diverted. There was a 5.9% neorectal prolapse recurrence rate, which occurred after an Altmeier procedure. This was repaired with a colonic J pouch and coloanal anastomosis. Five patients (27.7%) developed clustering and/or frequency after the repair of the prolapse.

**Conclusions/Discussion:** The major operative challenge of low rectal cancer surgery is gaining enough length to perform a tension free anastomosis. Prolapse of the neorectum is a relatively rare occurrence but has marked increase in patients with an MIS TATA or taTME. This “new” complication can be addressed transanally without the need for a diverting stoma.

### OBSTACLES THAT IMPACT TREATMENT OF FECAL INCONTINENCE.

S38

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**Purpose/Background:** Fecal incontinence (FI) is a common problem which significantly affects quality of life. Advanced treatment options, including biofeedback therapy and sacral nerve stimulation (SNS), are now available to patients. Approximately 50% of patients improve

**S36 Table 1 Concordance study carried out between dynamic pelvic magnetic resonance imaging and videofecography in evaluating pelvic floor disorders.**

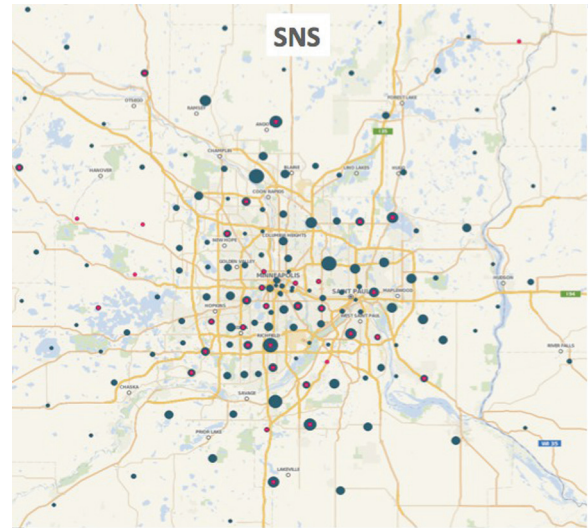
Diagnosis	$\kappa$ value	CI at 95%	$\kappa$ Interpretation
Anismus	0.88	(0.63-1.12)	Almost perfect agreement
Rectal prolapse	0.83	(0.59-1.06)	Almost perfect agreement
Enterocele	0.80	(0.62-0.99)	Substantial agreement
Rectocele Grade III	0.65	(0.41-0.88)	Substantial agreement
Intussusception	0.50	(0.21-0.79)	Moderate agreement
Rectocele Grade II	0.49	(0.22-0.76)	Moderate agreement
Rectocele Grade I	0.30	(-0.34-0.95)	Slight agreement
Pelvic laxity	0.22	(-0.10-0.55)	Slight agreement

with medical management so a significant percentage would be eligible for these treatment options. Our goal was to determine what proportion of patients received these treatments and identify barriers to patient access to treatment.

**Methods/Interventions:** A retrospective review was performed of all patients seen with FI from June 2012 to October 2015 by a large colorectal surgery practice in metropolitan Minnesota. Patient demographics, pelvic floor testing, surgical and non-surgical treatment, follow up and survey data were collected. The Six Sigma process was then used to analyze the data, identify barriers and develop a plan to improve patient access and the number of patients receiving advanced treatment options.

**Results/Outcome(s):** 1373 patients were seen for FI by 21 providers (mean 73 patients/month, 76.6% women) Only 259 (11.6%) received biofeedback and 79 (3.5%) received SNS. Patient attrition was significant, with only 52% seen for a second visit, 28% for a third and 16% for a fourth time from initial diagnosis of FI to treatment averaged 117.8 days for SNS (range 57-332 days), and 126.1 days for biofeedback (range 29-727 days). Three of the colorectal surgeons have a specialized interest in pelvic floor disorders and perform SNS. Patients seen initially by these surgeons had fewer visits prior to receiving either SNS (1.50 vs, 7.79 visits for specialized vs. nonspecialized providers) or biofeedback (1.73 vs. 6.77 visits), and were more likely to receive biofeedback or SNS (>10% and >3% of patients seen). It was often several months before the first available biofeedback appointment as well as a high rate of no-show and cancellations. Geographic proximity to care affected whether patients underwent treatment. No show and cancellation rates for biofeedback were higher for patients who lived further from the centers. Patients who lived closer to locations offering SNS surgery were more likely to receive SNS.

**Conclusions/Discussion:** Even when patients with FI are seen by colorectal surgeons, very few receive advanced treatment options. We found that prolonged waiting times, distance patients travel for treatment and level of provider specialization are obstacles to successful and timely treatment. Broader geographic distribution of services, adding biofeedback and SNS providers, standardizing the treatment algorithm within the practices and providing patients with an overview of the treatment algorithm (to prevent attrition if initial medical management was not successful) were all identified as means to improve the number of patients receiving advanced therapies.



FI patients Treated with SNS by zipcode. Blue Dots: FI patients that have been identified but not treated with SNS. Pink Dots: FI patients that have been treated with SNS. Dot size correlates with size of population of interest.

### SACRAL NERVE STIMULATION FOR FECAL INCONTINENCE: THE NEW YORK STATE EXPERIENCE.

S39

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**Purpose/Background:** The sacral nerve stimulator (SNS) has been an accepted treatment for fecal incontinence since 2011, but there is a paucity of real-world data regarding the use of these devices and as well as complications after implantation. The aim of this study was to examine the utilization of SNS for fecal incontinence and complications following implantation in a large state-wide patient database.

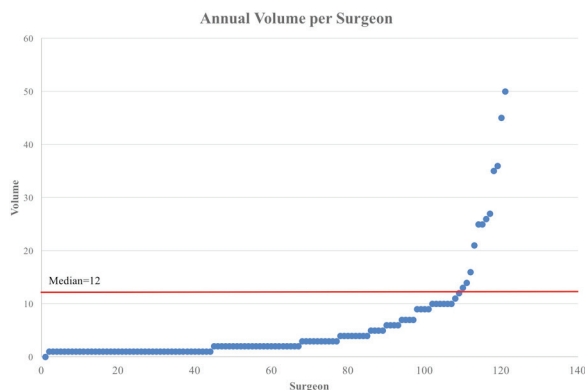
**Methods/Interventions:** The New York Statewide Planning and Research Cooperative System was queried for all patients with a primary diagnosis of fecal incontinence who had received implantation of sacral nerve electrodes (Stage 1) from 2011-2014. Patients who completed Stage 1 were then queried for the rate of pulse generator placement (Stage 2). Patients who completed Stage 2 were then examined for complications including: unplanned 30-day admission, emergency department (ED) visit within 30-days, revision or explant of leads, revision or explant of receiver, and 30-day mortality.

**Results/Outcome(s):** 120 surgeons (case volume 1-50, median 12) in the state of New York performed SNS over the 4 year time period. Amongst patients who underwent stage I (689 patients), 443 (64.3%) proceeded to Stage 2. The rate of successful completion did not increase over time but the number of total patients who had a SNS procedure increased almost 4-fold from 60 in 2011 to 222



in 2014. Patients who completed Stage 2 were more likely to be white, have a surgeon who was boarded in colorectal surgery, and was treated by a high SNS volume surgeon and hospital compared to those who only completed Stage 1. Among those who completed stage 2, 3 (0.7%) patients had an unplanned 30-day admission and 23 (5.2%) patients had an ED visit within 30-days. There were no 30-day mortalities. 6 patients (1.3%) had a revision or explant of their leads and 14 patients (3.2%) had a revision or explant of their generator. One patient eventually had a colostomy procedure.

**Conclusions/Discussion:** Our study provides an overview of the use of SNS across all hospitals in New York State. SNS procedures have increased almost 4-fold between 2011 to 2014 with a large difference in case volume between the lowest and highest volume surgeons. Colorectal surgery training, along with high surgeon and hospital SNS volume were associated with successful completion to full implant. This data suggests that patients may have higher success rates when treated by high-volume surgeons although functional outcomes remain to be studied.



## SDF-1 PLASMID REGENERATES BOTH SMOOTH AND SKELETAL MUSCLE AFTER ANAL SPHINCTER INJURY IN THE LONG TERM.

S40

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Cleveland, OH; Akron, OH

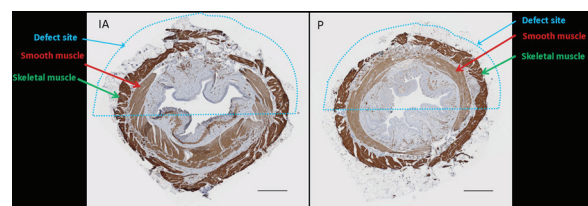
**Purpose/Background:** Regenerating muscle at a time remote from injury requires re-expression of cytokines to attract stem cells to start and sustain the process of repair. We have demonstrated that a non-viral plasmid expressing stromal cell-derived factor 1 (SDF-1) increased muscle regeneration 4 weeks after treatment following a large chronic anal injury. Our aim was to evaluate the sustainability of this muscle regeneration and evaluate the muscle morphology and molecular mechanisms that lead to it.

**Methods/Interventions:** 56 female age/weight-matched Sprague-Dawley rats underwent an excision of 50% of

the circumference of the anal sphincter complex. Three weeks after injury, rats were randomly allocated to 1 of 4 groups (n=8) based on treatment: injury with no intervention (IA); 100µg plasmid encoding SDF-1 injected locally (P); both plasmid and  $8 \times 10^5$  mesenchymal stem cells (MSC) injected locally (P+MSC) and plasmid injected locally with injection of a gelatin scaffold mixed with MSC (P+S&MSC). Rats underwent anal manometry pre-excision and pre and post-treatment. ImagePro Plus 7.0 was used for histological quantification by comparing muscle regenerated and fibrosis at the site of defect with intact muscle in the same section at 8 weeks. Immunohistochemistry used Desmin antibody for muscle identification. Protein expression of CXCR4 (receptor of SDF-1) and skeletal muscle proliferation/differentiation marker Myf5 was done by Western Blot at day 7 post treatment. One way ANOVA followed by Tukey test was used for data analysis (mean±SD),  $p < 0.05$  was regarded as significant.

**Results/Outcome(s):** Pretreatment anal pressures were not significantly different among groups. 8 weeks post-treatment all 3 groups receiving the plasmid had significantly higher pressures (cmH<sub>2</sub>O) (P:  $10.9 \pm 2.11$ ,  $p = 0.006$ , P+MSC:  $13.1 \pm 7.07$ ,  $p = 0.04$ , P+S&MSC:  $10.6 \pm 3.70$ ,  $p < 0.001$ ) than the IA group ( $3.4 \pm 0.96$ ). Qualitative assessment of histology revealed that the plasmid alone group showed more organized muscle architecture in the entire circumference of the defect. Muscle quantification showed that compared to IA ( $0.9 \pm 0.06$ ) only the plasmid alone group had significantly more muscle in the area of the defect (P:  $1.0 \pm 0.09$ ,  $p = 0.03$ ). On comparing the connective tissue the plasmid alone group ( $1.1 \pm 0.07$ ) had significantly less fibrosis than the IA ( $1.4 \pm 0.24$ ,  $p = 0.02$ ) and P+S&MSC groups ( $1.4 \pm 0.21$ ,  $p = 0.03$ ). Immunohistochemistry showed that there is no change in the ratio of new smooth to new skeletal muscle among groups with treatments ( $p > 0.05$ ) (figure). There were no significant differences in protein levels of CXCR4 or Myf5 between groups 7 days after treatment.

**Conclusions/Discussion:** SDF-1 plasmid increased anal sphincter pressures 8 weeks post-treatment to near pre-excision levels. SDF-1 plasmid alone also regenerated both smooth and skeletal muscle and decreased fibrosis at the site of defect which could **not** be attributed to a change in the expression of cytokines CXCR4 and Myf5.



Representative pictures of tranverse sections of rat anal canal stained by Desmin antibody. These sections are 3 weeks post-excision of 50% of the circumference of the anal sphincter and treated with injury without treatment (IA) (right) and SDF-1plasmid local injection at the site of the defect (P) (left). There is regeneration of both smooth and skeletal muscle which is organized in the plasmid treated group. In the area of the defect (circled by blue oval), smooth muscle is indicated by red arrow and skeletal muscle is indicated by green arrow. Scale bar= 1mm.

### PERINEAL AND ABDOMINAL APPROACH FOR RECTAL PROLAPSE: EQUIVALENT DURABILITY AT ONE YEAR.

S41

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**Purpose/Background:** Current practice guidelines for management of rectal prolapse recommend an abdominal approach, when feasible, due to a perceived improvement in durability compared with a perineal approach. However, this recommendation has not been validated using a large contemporary dataset. Therefore, we aim to compare the re-intervention rates between abdominal and perineal approaches for rectal prolapse.

**Methods/Interventions:** The Healthcare Cost and Utilization Project (HCUP) State Inpatient Database (2007-2010) was queried for patients who underwent an operative repair of rectal prolapse. Patients were grouped by surgical approach, either abdominal or perineal. Abdominal operation is inclusive of both open and laparoscopic approaches. After multivariable adjustment for demographic and clinical variables, rate and timing of re-intervention for prolapse were compared between groups.

**Results/Outcome(s):** Among 4,504 patients who underwent operative repair of rectal prolapse 2,334 (51.8%) had an abdominal approach, and 2,170 (48.2%) had a perineal approach. The median age was 68 for the abdominal repair cohort and 74 for the perineal group ( $p < 0.001$ ). Postoperative complication rates were equivalent between the approaches for surgical site infection (abdominal 1.8% vs. perineal 1.4%,  $p = 0.27$ ), abscess formation (abdominal 0.3% vs. perineal 0.4%,  $p = 0.50$ ), sepsis (abdominal 1.2% vs. perineal 0.7%,  $p = 0.12$ ), pneumonia (abdominal 0% vs. perineal 0%,  $p = 0.34$ ), venous thromboembolism (abdominal 1.7% vs. 1.5%,  $p = 0.61$ ), renal failure (abdominal 1.6% vs. perineal 1.3%,  $p = 0.35$ ), and postoperative bleeding (abdominal 1.5% vs. perineal 0.9%,  $p = .10$ ). However, the abdominal approach had higher rates of postoperative anastomotic leak (abdominal 5.2% vs. perineal 2.7%,  $p < 0.001$ ), and respiratory failure (abdominal 0.9% vs. perineal 0.3%,  $p = 0.01$ ). When adjusting for patient and clinical factors, patients undergoing abdominal approach had a longer length of stay (abdominal 5.0 days vs. perineal 3.0 days,  $p < 0.001$ ). The rates of re-intervention were

equivalent between the two approaches at one year in both unadjusted (abdominal 3.2% vs. perineal 3.7%,  $p = 0.30$ ) and multivariable adjusted analysis (OR (abdominal approach as reference): 1.12 95% CI: 0.74-1.7,  $p = 0.60$ ). For patients who required re-intervention in the first year time to reoperation was similar with 28.8 weeks following an abdominal approach compared to 29.3 weeks following perineal approach ( $p = 0.66$ ).

**Conclusions/Discussion:** Perineal approach for rectal prolapse results in decreased postoperative complications, shorter length of stay, and equivalent durability at one year compared to an abdominal approach. These findings suggest that the perineal approach should be considered for patients with rectal prolapse, although further investigation with prospective studies is warranted specifically accounting for laparoscopic abdominal approaches.

### IS RESECTION RECTOPEXY STILL AN ACCEPTABLE OPERATION FOR RECTAL PROLAPSE?

S42

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**Purpose/Background:** Resection rectopexy (RR) has been a well-established procedure in appropriate patients to treat rectal prolapse. Most recently ventral rectopexy (VR) has been added to the surgical armamentarium for this disease and many international published reports have implied that this procedure is superior and should be the gold standard due to superior outcomes. The aim of this study was to compare the outcomes of RR and VR.

**Methods/Interventions:** This IRB approved retrospective study compared consecutive patients at a single institution with full thickness rectal prolapse who underwent RR and VR between 2009 -2016. Choice of operation was determined by the surgeon after assessing the patient. Patients undergoing surgical procedure for internal rectal prolapse were excluded. Procedures were performed through open, laparoscopic and robotic approach and pelvic organ prolapse were addressed as a combined procedure after multidisciplinary assessment as needed. Data regarding demographics, surgical procedure details, 30-day complications, follow up, recurrence and functional outcomes were collected.

**Results/Outcome(s):** 108 patients underwent VR and 79 patients underwent RR during the study period. There were no differences between groups regarding gender (Female 103 vs 72;  $p = 0.39$ ) and age (59.3 vs 53.9;  $p = 0.05$ ). Patients in the VR group had a greater BMI (25.5 vs 22.9;  $p = 0.001$ ) and worse physical status (ASA 3 57.4% vs 41.8%;  $p = 0.04$ ). RR patients reported higher preoperative constipation scores ( $p = 0.009$ ) while VR group had higher fecal incontinence scores ( $p = 0.04$ ). The VR group had significantly more: robotic approaches (69.4% vs 8.9%;

p <.001), concomitant urogynecological procedures (63 vs. 19; p<0.001), and longer operative time (269 vs 206 minutes; p<0.001), but a reduced length of stay (2 vs 5; p<0.001). No differences were observed in conversion rates (5.6% vs 3.8%; p=0.83). The median follow up and

the median time of recurrence were similar and no differences were observed for complication rates or prolapse recurrence (see table). In both VR and RR pre- and post- op scores improved after surgery with no significant difference between groups (see table).

#### S42 Complications, recurrence and quality of life data

	Ventral Rectopexy (N = 108)	Resection Rectopexy (N = 79)	p-value
Complications	45 (41.7%)	21 (26.5%)	0.32
Anastomotic leak	-	-	-
Discitis	1 (0.9%)	-	1.00
Ileus	5 (4.6%)	5 (6.3%)	0.86
Mesh complications	1 (0.9%)	0 (0.0%)	1.00
Small bowel obstruction	3 (2.8%)	1 (1.3%)	0.85
Ureter injury	0 (0.0%)	1 (1.3%)	0.86
Wound infection	4 (3.7%)	2 (2.5%)	0.98
Cardiopulmonary	4 (3.7%)	4 (5.1%)	0.93
Urinary retention	16 (14.8%)	6 (7.6%)	0.20
Urinary tract infection	4 (3.7%)	2 (2.5%)	0.98
Readmission	7 (6.5%)	3 (3.8%)	0.63
Reoperation	3 (2.8%)	1 (1.3%)	0.85
Total prolapse recurrence	11 (10.2%)	8 (10.1%)	0.43 *
Prolapse recurrence - 1 year	5 (4.6%)	2 (2.5%)	0.43 *
Prolapse recurrence - 3 years	9 (8.3%)	4 (5.1%)	0.43 *
Prolapse recurrence - 5 years	11 (10.2%)	5 (6.3%)	0.43 *
Median time to recurrence (Months [IQR])	14.00 [7.00, 14.00]	38.00 [11.25, 71.25]	0.16
Median follow-up (Months [IQR])	16.00 [8.00, 46.25]	26.00 [10.00, 58.50]	0.13
Quality of life scores			
CSI pre-operative (median [IQR])	33.00 [16.00, 42.00]	52.00 [38.00, 57.50]	0.009
CSI postoperative (median [IQR])	11.00 [0.00, 28.00]	42.00 [30.50, 49.00]	<0.001
CSI difference (median [IQR])	-14.00 [-20.00, 0.00]	-10.00 [-16.50, 5.00]	0.24
FIQL pre-operative (median [IQR])	8.61 [5.60, 11.50]	10.55 [9.50, 12.69]	0.04
FIQL postoperative (median [IQR])	11.00 [6.26, 14.09]	8.36 [0.00, 14.78]	0.67
FIQL difference (median [IQR])	1.96 [-0.20, 4.19]	0.01 [-9.50, 0.58]	0.055
Wexner pre-operative (median [IQR])	12.00 [0.00, 15.00]	4.00 [0.00, 11.00]	0.045
Wexner postoperative (median [IQR])	7.00 [0.00, 12.00]	4.00 [0.00, 9.00]	0.48
Wexner difference (median [IQR])	-1.50 [-5.00, 0.00]	0.00 [-1.00, 0.00]	0.08

Data in numbers/ percentage unless otherwise specified.

\*Kaplan Meier curve values.

CSI: constipation severity index; FIQOL: fecal incontinence quality of life score;

**Conclusions/Discussion:** Both techniques performed for the treatment of full thickness rectal prolapse provide similar functional outcomes and recurrence rates. Careful patient selection increases the likelihood of success on postoperative results and requires evaluation by the surgeon to determine the best procedure for each individual patient. Therefore, RR is still a viable option for appropriate patients with rectal prolapse.

## ESTROGEN REPLACEMENT THERAPY AND COLON CANCER INCIDENCE AND MORTALITY IN THE PLCO TRIAL.

S43

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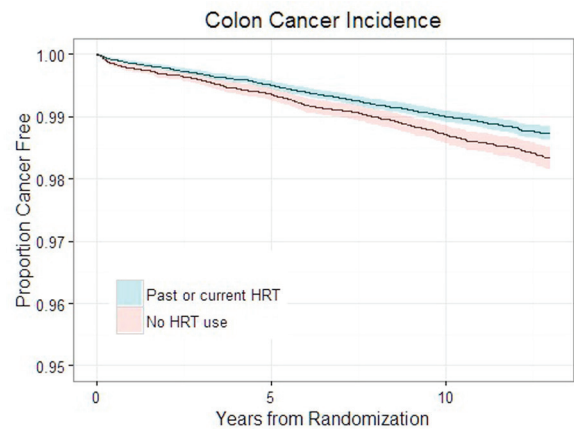
**Purpose/Background:** Estrogen replacement therapy in post-menopausal women has been implicated as both protective and harmful in a variety of cancers. Previous work has suggested that estrogen replacement therapy is associated with a reduced incidence of colorectal polyp formation.

**Methods/Interventions:** We performed a secondary analysis of data collected from the Prostate, Lung, Colorectal, and Ovarian (PLCO) cancer trial, a large multicenter randomized controlled trial run by the National Cancer Institute (NCI) from 1993-2001, with follow up data recently becoming mature. Data accrued in the trial were analyzed to evaluate CRC incidence, disease specific, and all-cause mortality, stratifying patients based on their use of estrogen replacement therapy. The PLCO trial randomized a total of 154,897 participants to either usual care or a screening protocol which included two flexible sigmoidoscopies. Participants were then observed for a mean of 11 years. Participants were adults aged 55-74 who did not have colonoscopy in the 3 years preceding randomization. Hormone use as well as additional demographic and comorbidity data were collected via self-report. A review committee utilized National Death Index data, death certificates, and annual questionnaires to determine the time and cause of death for each participant. A Cox proportional hazards model was constructed to compare survival of estrogen replacement users and nonusers. All data were obtained from the NCI and exempted from IRB review.

**Results/Outcome(s):** 75,688 women with documented estrogen replacement therapy status were included for analysis. 913(1.21%) developed colorectal cancer within the study period. Compared to women without a diagnosis of cancer, women with CRC were older (62.5y vs 64.1,  $p < 0.001$ ), had a higher BMI (27.1 vs 27.5,  $p = 0.027$ ), and were more likely to have a family history of CRC (11.0% vs 14.9%,  $p < 0.001$ ). Participants in both groups tended to be white (88.6% vs 89.4%,  $p = 0.12$ ). Past or current hormone replacement therapy was less common in patients with

CRC (66.5% vs 60.6%,  $p < 0.001$ ), as was regular aspirin use (42.3% vs 38.7%,  $p = 0.03$ ). Compared to women with no estrogen use, those with past or current estrogen use had a reduced risk of CRC incidence (HR=0.87; 95% CI, 0.76 – 1.00). There were no statistically significant differences in overall or disease-specific survival for estrogen users versus non-users.

**Conclusions/Discussion:** Hormone replacement therapy is associated with a reduced risk of colorectal cancer incidence in both past and current users. However, there is no survival difference among estrogen users with colorectal cancer, adding more data to the possible protective effects of estrogen.



Colon cancer incidence in women based on use of hormone replacement therapy (HRT). Ribbon represents 95% confidence interval.

## CONSENSUS MOLECULAR CLASSIFICATION OF COLORECTAL CANCER AND ASSOCIATION WITH THE COLONIC MICROBIOME.

S44

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**Purpose/Background:** Colorectal cancer (CRC) is the second most common cancer worldwide, and shows heterogeneous response to treatment and outcomes. Most CRCs are sporadic, and follow a pattern one would expect from a yet unidentified environmental source. Recent studies have classified CRC based on various molecular markers, but discrepancies exist between these classification systems, and they are not widely used in the clinical setting. In 2015, a large international consortium published a classification system based on gene expression data. These published classifiers stratify CRC into four consensus molecular subtypes (CMS). The human colon plays host to a vast and complex microbial community of  $< 10^{12}$  microorganisms, and gut dysbiosis is believed to play a role in the development of CRC. This study brings together two key emerging research avenues, namely the new clinical frontier of applying information on the gut

microbiome to treatment and management of CRC, and the use of advanced molecular classification systems to better investigate the development of CRC.

**Methods/Interventions:** Frozen tumour tissue from 34 patients with CRC was accessed from our institutional tissue bank, and RNA and DNA was extracted from the tissue samples. Extensive clinical and follow-up data was available on this patient cohort. 16S rRNA sequencing (V3 and V4 regions) was carried out on tumour DNA, using the Illumina MiSeq platform. Taxonomic classification of bacteria was carried out using the Greengenes database, and clusters of orthologous groups were analysed using the KEGG orthology database. RNA-sequencing was carried out using the Illumina HiSeq 2500 V4 platform, and tumours were stratified into CMS based on gene expression data. Non-human RNA-seq reads were mapped to reference bacterial genomes using a modified version of Kraken. Computational tools were developed to analyse associations between microbiome patterns, bacterial transcript expression, and tumour gene expression.

**Results/Outcome(s):** Analysis of tumour microbiomes showed significant phylum-level changes and increased beta-diversity associated with tumour differentiation state, tumour location, and molecular subtype. 30/34 CRC tumours were successfully stratified into CMS subtypes using gene-expression data. Detection of bacterial transcripts in tumour tissue identified bacteria with an established role in colorectal carcinogenesis, in addition to novel putative pathogens associated with molecular subtypes.

**Conclusions/Discussion:** This is the first study of its kind to link CRC tumour microbiome patterns and specific bacterial species to tumour gene expression and molecular subtypes. This represents an important step in understanding the interplay between microbial diversity in the gut and the molecular mechanisms involved in the development of CRC.

#### PREOPERATIVE INTRAVENOUS IRON IMPROVES POSTOPERATIVE QUALITY OF LIFE IN ANAEMIC COLORECTAL CANCER PATIENTS: RESULTS FROM THE IVICA TRIAL.

S47

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**Purpose/Background:** Anaemia is associated with multiple symptoms including fatigue which can contribute to impaired quality of life. It is a common finding in colorectal cancer as a result of chronic insidious haemorrhage and impaired iron haemostasis. Consequently, colorectal cancer patients are at risk of the symptomatology of anaemia.

**Methods/Interventions:** Preoperative colorectal cancer patients (n=116) who were found to be anaemic (>1g/dL below the World Health Organisation definition) were randomised to receive either intravenous (IV) or oral iron. Quality of life (QOL) questionnaires were performed at; [i] recruitment prior to intervention, [ii] after at least 14 days of iron therapy on the day of surgery and [iii] post-operatively in the first outpatient follow-up. QOL assessments undertaken included the following; [a] Functional Assessment of Cancer Therapy-Anaemia (FACT-AN) [b] EuroQol EQ-5D-5L (EQ5D) and [c] modified Short-Form 36 (SF36) v1 questionnaires.

**Results/Outcome(s):** Both groups were comparable in patient demographics, starting haemoglobin, operative details, tumour histology and time from recruitment to postoperative review (oral 101 days [IQR 62-193]; IV 91 days [IQR 61-135, P=0.98]. Despite homogeneity in all initial QOL scores at recruitment significant differences were evident between groups at outpatient review in all but two of the SF36 components including: *Role Limitation due to pain* (Oral 48.37u [48.4-50]; IV 77.5u [63.3-91.7]; P<0.05), *General Health* (Oral 64.79u [58.8-70.8]; IV 73.63u [68.4-78.8]; P<0.01), *Vitality* (Oral 60.49u [53.7-67.3]; IV 74.83u [69.2-80.5]; P<0.001), *Social Functioning* (Oral 76.47u [66.6-86.3]; IV 90u [83.7-96.3]; P<0.05), *Role limitation due to emotion* (Oral 67.65 [51.8-83.5]; IV 85.56u [73.9-97.2]; P<0.05), *Mental Health* (Oral 81.77u [77.4-86.1]; IV 91.33u [88-94.7]; P<0.01) and *Mental Component Summary* (Oral 51.9u [48.5-55.3]; IV 58.11u [56-60.2]; P<0.01). EQ5D scores for the visual analogue scale were also significantly higher in the IV group at outpatient review (OI 70.9u [65.1-76.8]; IV 82.53u [77.8-87.2]; P<0.001), with parity in the remaining 4 components. Furthermore, significant differences were evident in FACT-AN *Total scores* (Oral 148.3u [139-158]; IV 166.1u [160-172.3]; P<0.01), FACT-AN *Anaemia subscale scores* (Oral 59.6u [54.4-64.8]; IV 69.1u [65.7-72.5]; P<0.01), *Functional Well Being* (Oral 20.2u [17.9-22.5]; IV 24.1u [22.2-26]; P<0.01) and *Emotional Well Being* (Oral 19.9u [18.5-21.2]; IV 21.5u [20-23]; P<0.05) at outpatient review, with parity in only two components. None of the QOL measures had higher scores in the oral group.

**Conclusions/Discussion:** Intravenous iron is more efficacious than oral iron at improving the quality of life of anaemic colorectal cancer patients.

#### THE INCIDENCE OF MALIGNANT CONVERSION OF ANAL DYSPLASIA TO SQUAMOUS CELL CARCINOMA OF THE ANUS.

S48

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**Purpose/Background:** Anal squamous cell carcinoma (SCC) is a virally mediated cancer from the sexually

transmitted human papilloma virus (HPV). The HIV epidemic led to an increase in the incidence of SCC, leading to the recommendation of screening techniques for HIV positive and other high risk patients. The efficacy of these screening regimens depends upon the natural incidence of SCC, which has not been well defined in the literature. The purpose of this study was to define the natural rate of malignant transition from anal dysplasia to SCC in high risk groups and the general population.

**Methods/Interventions:** This was a retrospective cohort study of all patients with an active membership for at least 1 year with Kaiser Permanente Southern California (KPSC) between 1/1/2005 and 12/31/2015. Based on ICD-9 coding, we classified patients with diagnosed high grade or low grade anal dysplasia (HGD and LGD), HIV, a history of cervical cancer (hCC), high grade cervical dysplasia (CD) or genital warts (CA) with the earliest date of each diagnosis as the index date. A KPSC SEER-based cancer registry identified all incident anal cancers diagnosed during the study period and prevalent SCC cases were excluded. SCC cumulative incidence and incidence rates were estimated for each subgroup. Importantly, all patients were screened with routine standard DRE and anoscopy every 3-12 months, with biopsy performed only for grossly abnormal lesions. Our physicians did not perform high resolution anoscopy (HRA), Papanicolaou smears, or other aggressive surveillance techniques.

**Results/Outcome(s):** From 2005 to 2015, there were 462 new anal SCC diagnoses within a general population of 5,986,343 patients. In terms of high risk groups, there were 393 patients with HGD, 501 with LGD, 5625 HIV positive, 1168 with hCC, 94862 with CD, and 15725 with CA. The mean length of patient follow-up for the whole cohort was 5.4 years. The cumulative SCC incidence for the hCC, CD, CA and HIV patients were no different from that of the general population (all <0.1% during the study period). The HGD and LGD populations had a statistically higher cumulative incidence of SCC during

the study period (2.8% and 0.8% respectively,  $p < 0.001$ ). Interestingly, there were 0 incident cases of SCC in our 133 HIV positive patients with any anal dysplasia. Of note, 410 cases of anal SCC (88.7%) were diagnosed in patients without a pre-existing high risk diagnosis.

**Conclusions/Discussion:** Our large population-based data set documents the natural progression of anal dysplasia to anal SCC in general and high risk populations. Contrary to historical results, our data does not indicate an increased incidence of anal SCC in our HIV population, and shows a cumulative incidence of 2.8% for HGD patients and 0.8% for LGD patients. This low rate of malignant conversion suggests that aggressive surveillance regimens, such as HRA, may lead to unnecessary procedures even in high risk patients.

#### SQUAMOUS CELL CANCERS OF THE RECTUM DEMONSTRATE POORER SURVIVAL AND INCREASED NEED FOR SALVAGE SURGERY COMPARED TO SQUAMOUS CANCERS OF THE ANUS.

S49

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**Purpose/Background:** Squamous cell cancers of the anus (aSCC) are rare gastrointestinal malignancies for which neoadjuvant chemoradiation is the first line treatment in the absence of distant disease. Squamous cell cancers of the rectum (rSCC) are far less common, and it is unclear if chemoradiotherapy improves their outcomes as is observed with aSCC. The aim of this study was to compare survival by stage for aSCC and rSCC based upon various treatment approaches.

**Methods/Interventions:** Cohorts comprised of patients with aSCC and rSCC were formed using the National Cancer Database (2006-2012). Patients with pre-treatment

**S48 Table 1. Incidence of SCC in high risk groups and general population**

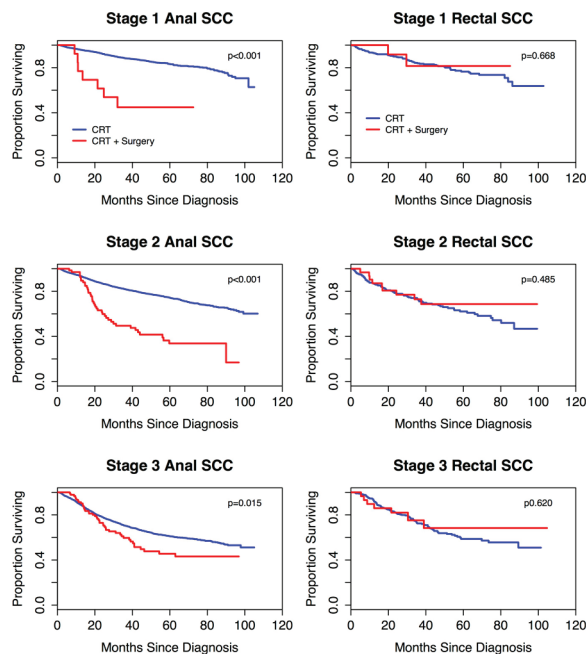
High Risk Group	Number of Patients	Number of SCC Events	Person-Years at risk	Incidence Rate (per 100K person-years)	Mean Follow-Up (months)	Cumulative Incidence
High Grade Anal Dysplasia	393	11	2123	518 ( $p < 0.001$ )	64.8	2.80% ( $p < 0.001$ )
Low Grade Anal Dysplasia	501	4	1266	316 ( $p < 0.001$ )	30	0.80% ( $p < 0.001$ )
HIV Positive	5,625	5	27,393	18	88.8	0.09%
History of Cervical Cancer	1,168	0	8,608	0	73.2	0.0%
Genital Warts	15,725	5	96,436	5	60	0.03%
High Grade Cervical Dysplasia	94,862	27	477,029	6	58.8	0.03%
General Population	5,864,286	410	31,738,190	1	64.8	0.01%

Incidence Rates presented per 100,000 person-year at risk

clinical stage I-III disease who underwent chemoradiotherapy, with and without subsequent salvage surgical resection (defined as low anterior resection or abdominoperineal resection at least 12 weeks after the initiation of radiation therapy), were included. Patient and disease characteristics were compared between the cohorts using standard univariate statistics. After stratification by clinical stage and location (aSCC versus rSCC), overall survival was compared using Kaplan-Meier curves and log-rank tests. The survival implications of undergoing salvage surgery were also compared between aSCC and rSCC.

**Results/Outcome(s):** A total of 11,159 patients with aSCC and 1,036 patients with rSCC were identified. Patients with rSCC were more often female (72.4% vs. 67.5%;  $p=0.001$ ), but otherwise did not differ from those with aSCC regarding age, race, or number of comorbidities. The majority of patients with aSCC presented with either clinical stage II (45.7%) or stage III (36.3%) disease, whereas the clinical presentations of rSCC patients were more evenly distributed among stages I-III ( $p<0.001$ ). A significantly higher proportion of patients with rSCC underwent LAR or APR at least 12 weeks following chemoradiotherapy than those undergoing APR for aSCC (7.0% versus 1.6%;  $p<0.001$ ). For patients with stage I and II disease, rSCC was associated with significantly worse survival compared to aSCC (stage I:  $p=0.017$ ; stage II:  $p<0.001$  for stage II), but survival was similar between the cohorts for stage III disease. For aSCC, the need for salvage surgery was associated with significantly worse survival for stage I-III cancers. Among those with rSCC, the need for salvage surgery did not significantly impact survival for any stage of disease (Figure).

**Conclusions/Discussion:** rSCC is associated with significantly worse survival than aSCC for clinical stage I and II disease. Despite both cancers exhibiting squamous histology, rSCC may be less radiosensitive than aSCC as reflected in a greater incidence of salvage surgery which does not appear to significantly improve overall survival.



#### SALVAGE SURGERY FOR ANAL SCC - A 30 YEAR EXPERIENCE.

S50a

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**Purpose/Background:** Anal squamous cell carcinoma (SCC) has more than doubled in incidence over the last forty years without an improvement in survival. While chemoradiotherapy achieves a good outcome for many patients, a significant number suffer from persistent disease and local relapse. This study examines factors related to treatment failure following chemoradiotherapy for anal SCC at a single quaternary centre, and determines the outcomes of patients undergoing salvage pelvic resection.

**Methods/Interventions:** Patients with anal squamous cell carcinoma treated with radical chemoradiotherapy at a single quaternary centre between 1983 and 2015 were identified from a prospectively maintained database. Multivariate regression analysis was used to determine factors associated with local treatment failure requiring salvage surgery. This subset of salvage surgery patients were assessed for factors associated with morbidity and outcome. Disease free and overall survival were calculated by Kaplan-Meier analysis.

**Results/Outcome(s):** 483 primary anal SCC patients were managed over this time period, with 39 undergoing a salvage resection for pelvic disease in the absence of metastasis. Median time to clinical and radiological assessment post treatment was 87 days, with 15 patients (38%) suffering persistent disease and 24 (62%) developing local relapse. Median time to recurrence for the local relapse group was 342 days post treatment completion, with

the cohort having a female predominance (59%), and mean age of 60 at recurrence. On multivariate analysis, both T3-4 disease (22.5% vs 6.7%  $p < 0.0001$ ) and adjacent organ involvement (29.6% vs 8.6%  $p < 0.0001$ ) were found to be independent predictors for salvage surgery. 31 abdominoperineal resections were performed with 10 involving a posterior vaginectomy. 8 pelvic exenterations were also undertaken including vascular resection and intraoperative radiotherapy where indicated. Myocutaneous flaps were performed in 16 patients (41%), with a wound complication rate of 6%, and there was no surgical mortality. Margins were clear in 70% of resections, and all tumours demonstrated moderate or poor differentiation, without lymph node involvement. At a median follow up of 21 months (range 4 - 150 months) with one patient lost to follow up, overall survival was 63% with a disease free survival of 50% ( $p < 0.001$ ). 11 patients (29%) developed local recurrence, which included all 7 patients with an R1 resection, 3 of which underwent re-resection. 82% (9) died including the 3 re-resection patients and the remaining 2 are alive with persistent disease. 9 (24%) patients developed metastatic disease, of which 6 (67%) died and 2 are alive with persistent disease.

**Conclusions/Discussion:** Local recurrence in anal SCC can be salvaged, with R1 a strong predictor of further relapse and poor outcome. Radical surgery is required in a significant portion of patients, and a new strategy is needed for patients with advanced stage tumours to optimise local and distant control.

#### SURVIVAL FOLLOWING PELVIC EXENTERATION FOR LOCALLY ADVANCED AND RECURRENT RECTAL CANCER: ANALYSIS FROM AN INTERNATIONAL COLLABORATIVE.

S50

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**Purpose/Background:** The management of rectal cancer is rapidly evolving. Approximately, 5-10% of patients present with locally advanced rectal cancer (LARC) and an estimated 5% develop locally recurrent rectal cancer (LRRC). These patients are increasingly considered for pelvic exenteration. We assessed outcomes from a large multi-center collaboration and examined factors associated with surgical and survival outcomes.

**Methods/Interventions:** Consecutive patients who underwent pelvic exenteration for LARC and LRRC between 2004-2014 from twenty-six specialist centers, across four continents were included in final analysis. Primary endpoints included surgical and survival outcomes. Secondly we assessed factors that impacted long-term survival.

**Results/Outcome(s):** 2,475 patients underwent pelvic exenteration (1,291 LARC & 1,184 LRRC). 78% of LARC

and 49% of LRRC had neoadjuvant treatment. Over one-third of patients had a post-operative morbidity and <2% had a 30-day mortality. 80% of LARC and 55% of LRRC patients had a R0 resection. R0 was the single most important prognostic indicator of survival (5-year overall survival 49% for LARC and 36% for LRRC (log-rank  $p < 0.001$ )). Median survival for positive vs. negative node resection for LARC and LRRC was 31 vs. 46 and 22 vs. 29 months respectively. Neoadjuvant was associated with improved survival for LRRC but not for LARC, however, it was associated with a higher incidence of 30-day complications ( $p = 0.001$ ). Multivariate analysis identified resection margin status and nodal status as the main determinants of long-term survival for LARC, while margin status and bone resection were main determinants for LRRC.

**Conclusions/Discussion:** Collaborative data shows that exenterative surgery in specialist setting is associated with moderately good 5-year survival, with acceptable morbidity and mortality. These findings support centralization of exenterative surgery to specialist units.

#### IN VIVO AND IN VITRO EFFICACY OF DUAL PI3K/MTOR INHIBITION IN NOVEL MURINE MODELS OF ANAL CANCER.

S51

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**Purpose/Background:** Despite the continued rise in the incidence and mortality of anal cancer, therapeutic options for these patients remain unchanged. Furthermore, failure of standard of care chemoradiotherapy results in the need for radical surgical resection, which is associated significant morbidity and 5-year survival rates below 50%. There is strong patient and preclinical evidence that the PI3K/AKT/mTOR pathway has an important role in anal carcinoma. Even with this molecular evidence there are limited preclinical models to test potentially effective therapeutics to improve anal cancer treatment. We hypothesized that BEZ235, a dual PI3K/mTOR inhibitor, would produce a treatment effect similar to standard of care chemoradiotherapy in novel *in vivo* and *in vitro* models of anal cancer.

**Methods/Interventions:** Utilizing an established murine model of anal cancer that overexpresses the HPV oncoproteins E6 and E7 (K14E6/E7), we developed anal tumors via weekly treatment with the carcinogen DMBA. K14E6/E7 mice with established tumors were placed in one of the following groups: 1) no treatment controls (NTC), 2) BEZ235 (BEZ, 100 $\mu$ g daily via oral gavage), and 3) chemoradiotherapy (CRT) where mitomycin C (MMC, 6mg/kg i.p.), 5-fluorouracil (5-FU, 50mg/kg i.p.) and targeted radiation at 2 Gy (24 hours post-chemotherapy) were given every 5 weeks. Mice were assessed daily for morbidity/mortality, and tumor measurements were



captured every 2-3 days. Following tumor volume transformation to account for logarithmic growth, tumor growth rates were analyzed using a one-way ANOVA. Survival was assessed using a Kaplan-Meier analysis. Our *in vitro* model employed tumor spheroids grown in 3D culture for 72 hours with daily measurements of maximum spheroid width. Statistical comparisons of spheroid width between vehicle controls and three concentrations of BEZ were made using a repeated measures ANOVA.

**Results/Outcome(s):** Tumor growth rate between groups was significantly different. Those mice receiving no treatment had the highest growth rates ( $p < 0.0001$ ). Tukey post hoc testing showed significant differences between the NTC group (mean growth rate  $\pm$  SD;  $0.1 \pm 0.05$ ) and both the BEZ ( $0.005 \pm 0.006$ ;  $p < 0.0001$ ) and CRT ( $0.01 \pm 0.02$ ;  $p < 0.0001$ ) groups. Using a Kaplan-Meier analysis, the mean survival for the NTC group (mean days  $\pm$  SEM;  $20.2 \pm 3.5$ ) was significantly different from both the BEZ group ( $43.1 \pm 9.1$ ;  $p < 0.01$ ) and CRT group ( $38.9 \pm 4.8$ ;  $p < 0.01$ ). Finally, the efficacy of BEZ in our spheroid model was significant for all doses compared to vehicle control ( $p < 1e-9$ ).

**Conclusions/Discussion:** Our results show a prolonged inhibition of tumor growth using BEZ alone, with *in vivo* efficacy comparable to CRT. The failure to show significant difference between treatment groups is likely a reflection of our modest sample sizes. Our results warrant studying the combination of BEZ and CRT in both models, and continuing to increase the groups sample sizes in our *in vivo* model.

## CAN BUTYRATE INHIBIT COLON CANCER STEM CELL? AN IN VITRO STUDY.

S52

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**Purpose/Background:** Butyrate originates from the bacterial fermentation of dietary fibers. It has been shown to protect colorectal cancer by modulating the signaling pathways involved in carcinogenesis and inducing apoptosis in existing cancer cells. These protective effects of butyric acid have been demonstrated on colon cancer cells but have not been studied on colon-cancer initiating or colon-cancer stem cells. This is the first study to demonstrate the effect of butyrate on the inhibition of colon-cancer stem cells.

**Methods/Interventions:** Colon cancer cells HCT116 and colon cancer stem cells HCT116 were cultured and treated with various concentrations (3mM, 5mM and 10mM) of sodium butyrate for 24, 48, and 72 hours respectively. Cell viability assay using Presto Blue and apoptosis assay using flow cytometry were measured. The expression

of *GPR41*, *GPR43* and *SCL5A8* genes were measured using real time RT PCR.

**Results/Outcome(s):** The results showed that, under our culture conditions, butyrate inhibits the growth of HCT116 colon cancer stem cell and colon cancer cell line in a dose and time dependent manner. Morphological analysis demonstrated that at baseline HCT116 cancer stem cells were grouped as sphere-forming cells and were detached after butyrate treatment indicating apoptosis confirmed by flow cytometry. Three time of butyrate must be given in order to achieve the same effect of apoptosis in HCT116 cancer stem cells as compared to colon cancer cell line. The down-regulation of *GPR41* was observed in both cell types after the treatment of butyrate.

**Conclusions/Discussion:** The study demonstrated that butyrate inhibited colon-cancer stem cell proliferation in a dose-dependent manner. Our results showed a role of fiber diet and their metabolites on colon-cancer stem cell and demonstrated an intervention potential on the prevention and therapy of colorectal cancer.

## CD36: A POTENTIAL MODIFIER GENE IN FAMILIAL ADENOMATOUS POLYPOSIS.

S53

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**Purpose/Background:** The disease familial adenomatous polyposis is characterized by the development of hundreds to thousands of adenomatous polyps throughout the colon and rectum. Almost all people who have the condition will develop colorectal cancer at a young age unless they have prophylactic surgery. The disease is linked to mutations in the adenomatous polyposis coli (APC) gene and genotype phenotype correlations have been revealed that are associated with severe forms of the disease. Notwithstanding, some patients who should present with severe disease do not suggesting that additional genetic or environmental factors influence disease expression. Recently, studies in mouse models of FAP have revealed the existence of genetic modifiers of the disease phenotype. Until now, none of them has been shown to affect human disease. Recently CD36 has been revealed to be a modifier of disease in the mouse, with a demonstrated impact on tumorigenesis. This study aimed to investigate if single nucleotide polymorphisms (SNPs) in the CD36 gene could act as modifier genes for cancer development in human FAP patients.

**Methods/Interventions:** DNA was collected from 251 FAP patients, all of whom harboured germline mutations in the APC gene. Any patient who harboured a mutation in the APC gene that predisposes to attenuated FAP (or AFAP) was excluded from the study (these included mutations in exons 1-5, 9 and 3' to codon 1600). All

samples were obtained from the Hunter Area Pathology Service, Newcastle, NSW, and used for CD36 genotyping. Three CD36 SNP assays were undertaken using an allelic discrimination assay. Data recording extent of disease, presence of genetic mutations, age at diagnosis and intervention had been previously collated.

**Results/Outcome(s):** Kaplan-Meier analysis was suggestive of a protective effect in patients carrying the homozygote variant genotype of the SNP rs1984112, who appeared to develop disease approximately 10 years later than those patients who harboured only common allele. Heterozygotes for this change also appeared to develop disease at a later time point suggesting a dominant trait. The results of SNP rs1761667 suggest that the rare allele is associated with a lower age of disease development and that it appears as a recessive trait.

**Conclusions/Discussion:** These findings suggest that CD36 is the first modifier identified in a mouse model to be confirmed in the human disease counterpart. If confirmed this finding could potentially impact on the clinical management of these patients by better defining at which times surgery should be offered to this high risk group of patients.

### COMP GENE IS OVEREXPRESSED IN EARLY ONSET COLON CANCER AND ASSOCIATED WITH POOR SURVIVAL.

S55

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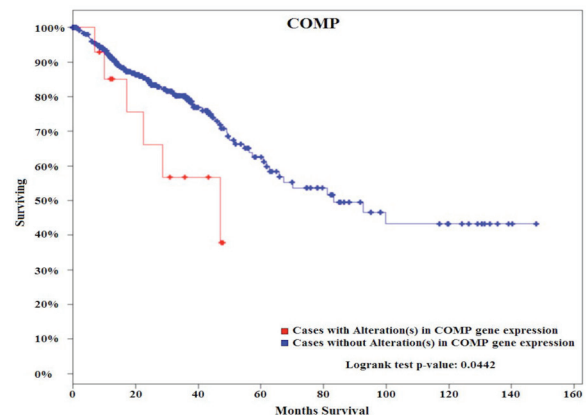
**Purpose/Background:** Although the overall incidence of colon cancer (CC) has steadily declined over the last three decades, the incidence has increased in patients younger than 50. The etiology of early-onset (EO) CC is not fully understood. COMP glycoprotein gene has been shown to confer tumor aggressiveness in pancreatic cancer. The aim of this study was to elucidate gene expression patterns in EOCC and show its uniqueness compared to late-onset (LO) disease. In addition, show that the overexpression of COMP gene is associated with poor survival.

**Methods/Interventions:** Two cohorts of patients with sporadic CC were identified. Tumors and matching noninvolved tissues from six EOCC patients (<50) and six late-onset colon cancers (LOCC) patients (>65) were obtained from pathology archives. De-paraffinized tissues were macro-dissected from FFPE sections, RNA isolated, and used for expression profiling of 770 cancer-related genes representing 13 canonical pathways. Survival analysis was performed using the cBioPortal for cancer genomics using 382 CRC patients from the TCGA Provisional database.

**Results/Outcome(s):** Among 770 genes assayed, changes in expression levels of 93 genes were statistically significant between EOCC and matching noninvolved tissues. There were also significant differences in expression

levels of 118 genes between LOCC and matching noninvolved tissues. Detailed comparative gene expression analysis between EOCC and LOCC normalized to their matching noninvolved tissues revealed that changes in expression of 88 genes were unique to EOCC using the cutoff criteria of expression levels difference >2 fold and P value <0.01. From these differentially expressed genes specific to EOCC, 28 genes were upregulated and 60 genes downregulated. At the pathway level, PI3K-AKT signaling was the most deregulated pathway in EOCC and cell cycle in LOCC. COMP glycoprotein was one of the genes that were uniquely over-expressed in EOCC. Survival analysis of 382 patients with CRC tumors using the cBioPortal for cancer genomics showed that CRC patients with alterations (all of them with up-regulated COMP) in COMP expression present with poorer overall survival compared to patients without alterations in COMP expression.

**Conclusions/Discussion:** These results suggest that sporadic EOCC is characterized by distinct molecular events compared to LOCC. In addition, COMP glycoprotein is overexpressed in EOCC and is associated with poor overall survival. COMP gene can potentially serve as a novel biomarker associated with EOCC as COMP glycoproteins could be detected in serum and urine.



### DEMETHYLATION INHIBITS MIGRATION AND INVASION OF DLD-1 COLORECTAL CANCER CELLS IN VITRO.

S56

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**Purpose/Background:** Extramural vascular invasion (EMVI) in rectal tumours is an important risk factor for disease recurrence and death. Recent studies have demonstrated CpG island hypermethylation phenotype (CIMP) to be an independent risk factor for developing EMVI. This study investigates the cellular processes linking hypermethylation with EMVI by an *in vitro* model of rectal

cancer, and assess the biological and epigenetic effects of demethylation.

**Methods/Interventions:** Hypermethylated DLD-1 human colorectal cancer cells were cultured and treated daily for three days with demethylating agent 5-azacytidine (AZA) across a dose range (0.5 $\mu$ M to 5 $\mu$ M), after which standard tests of population doubling (RPD) and cytotoxicity (trypan blue) were performed. Treated cells were then subjected to a 500 $\mu$ m gel-insert scratch migration assay and video microscopy was used to record time-to-convergence (TC). Treated cells were also seeded into Corning Matrigel invasion chambers (0.3cm<sup>2</sup>, 8 micron pore) and stimulated to invade through a basement membrane. Methylation specific PCR was performed on harvested cells across the dose range and compared to controls for eight genes associated with CIMP (SOCS1, MINT-1, hMLH, NEUROG1, THBD, HAND1, ADAMTS1, IGFBP3).

**Results/Outcome(s):** AZA demonstrated >50% reduction in RPD at a dose of 2 $\mu$ M, with a linear dose-dependent retardation of population growth from 0.1 $\mu$ M to 1.0 $\mu$ M. Trypan blue test also demonstrated linear increase in cytotoxicity up to 1 $\mu$ M. Mean TC was 38.6hrs +/- 2.4hrs (1SD) for control, solvent control (DMSO), and 0.5 $\mu$ M AZA. Mean TC for 1.0 $\mu$ M and 2.0 $\mu$ M AZA was 52.0hrs +/- 3.0hrs and 91.0hrs +/- 3.75hrs, respectively (p=<0.001). Cell invasion across the dose range demonstrated a strong dose-dependent positive correlation between AZA and number of invading cells; Pearson's r(19)=0.88, ANOVA p=<0.001. These effects were observed at doses below those considered cytotoxic. AZA incompletely demethylated 5 out of 8 CpG islands across the dose spectrum. hMLH, SOCS, and IGFBP3 were resistant to demethylation at all doses, but ADAMTS1, MINT, HAND, and THBD demonstrated demethylation at all doses.

**Conclusions/Discussion:** This study demonstrates that AZA reduced DLD-1 colorectal cancer cell migration and invasion through an extracellular matrix at sub-cytotoxic doses. Additionally, AZA demethylated 5 out of 8 genes associated with CIMP, indicating a direct link between hypermethylation and the ability of cells to migrate and invade *in vitro*. Further work is required to discover the cellular mechanisms that result in the reduced ability of DLD-1 cancer cells to invade after demethylation with 5-azacytidine, and may provide new avenues for novel therapeutics.

## ANAL SPHINCTER REGENERATION: A COMPARATIVE STUDY USING MESENCHYMAL STEM CELLS.

S57

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**Purpose/Background:** Mesenchymal stem cells (MSC) have been evaluated as an option for treatment in anal sphincter injury because of their regenerative effects. Factors involved in muscle regeneration include Galectin-1 which regulates differentiation of myoblasts to myotubes and Leukemia Inhibitory Factor (LIF) which promotes cell growth by inhibiting differentiation. Hypothesis: regardless of the origin of MSC, rat bone marrow derived (rMSC), human bone marrow-derived (hMSC) or human adipose tissue-derived (hADSC), improvements occur in physiological and histological outcomes after an acute anal sphincter injury.

**Methods/Interventions:** 54 weight and age-matched female Sprague Dawley rats were randomly allocated to 4 treatment groups after undergoing excision of 50% of the anal sphincter. 24 hours after excision(per our previous cytokine data) rats were either untreated(IA) or were treated with a local injection of rMSC, hMSC, or hADSC(8x10<sup>5</sup> cells,n=6/group). Anal pressures were measured pre-excision and 3 weeks post treatment. Using Image Pro Plus 7 each sample was used to compare the % of muscle and connective tissue at both the defect and intact area in the same section. Western Blot determined Galectin-1/ LIF expression normalized to an un-manipulated control. Histology and Western Blot data(mean $\pm$ SD) used One-way ANOVA with Tukey posthoc test, pressure data used two-way ANOVA with a Tukey posthoc test. p<0.05 was considered significantly different.

**Results/Outcome(s):** Manometry: There were no significant differences among the groups prior to excision. However, 3 weeks post-treatment anal pressures (cmH<sub>2</sub>O) in the IA group(5.0 $\pm$ 01.49) were significantly decreased compared to pre-excision levels(16.7 $\pm$ 9.04, p<0.001). 3 weeks post treatment the IA group (5.0 $\pm$ 1.49) had significantly lower pressures compared to hMSC(12.7 $\pm$ 3.99, p=0.01) and hADSC(13.0 $\pm$ 2.79, p=0.02) treated groups(Figure). Histology: Although all MSC-treated groups demonstrated increased muscle, significantly more muscle was seen in the hADSC group (1.0 $\pm$ 0.09, p=0.008) compared to IA (0.8 $\pm$ 0.02) at the site of defect. Significantly less fibrosis was noted in rMSC(1.2 $\pm$ 0.27, p=0.01), hADSC (1.1 $\pm$ 0.20, p=0.002) and hMSC(1.2 $\pm$ 0.27, p=0.03) treated groups compared to the IA group(1.6 $\pm$ 0.14). Western Blot: LIF protein expression was significantly increased in the IA group(2.6 $\pm$ 0.32, p<0.001) compared to the MSC-treated groups (rMSC: 0.6 $\pm$ 0.25, hADSC: 0.5 $\pm$ 0.17, hMSC: 0.9 $\pm$ 0.42). Galectin-1

protein expression was significantly decreased in the IA group ( $0.2 \pm 0.05$ ) compared to the hMSC group ( $0.6 \pm 0.29$ ,  $p=0.04$ ).

**Conclusions/Discussion:** In this rat model of an acute anal sphincter injury both hADSC and hMSC promoted muscle regeneration and increased resting anal pressures 3 weeks post-delivery. MSC from different origins decreased fibrosis equally which was associated with LIF suppression and Galectin-1 elevation. Future research will focus on human origin cells as a therapy for regenerating muscle in the anal sphincter.

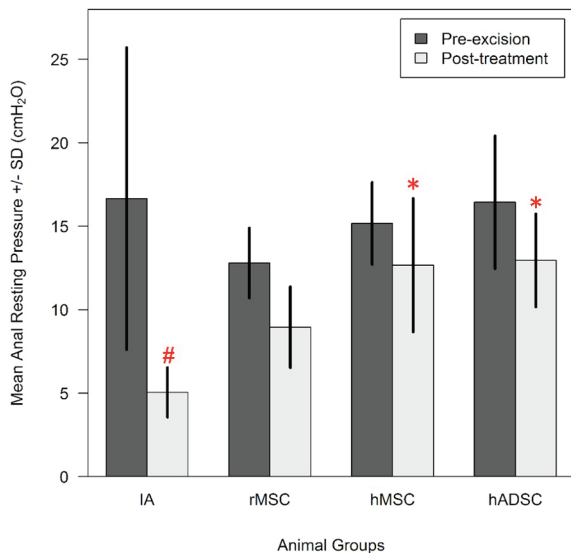


Figure. Bar plot showing the anal resting pressures of each group pre-injury and 3 weeks post treatment. The graph indicates that at the post-treatment time point, both hMSC and hADSC groups achieved a significant increase in anal pressure compared to IA. (Two way ANOVA followed by Tukey test was used and data was shown as mean  $\pm$  SD, \*  $p < 0.05$ ). The post-treatment pressure was significant lower than pre-excision in IA group (#  $p < 0.001$ ).

## HUMAN DERIVED AMNIOTIC MEMBRANE IS ASSOCIATED WITH DECREASED POSTOPERATIVE INTRAPERITONEAL ADHESIONS IN A RAT MODEL.

S58

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**Purpose/Background:** Adhesions after intra-abdominal surgery can result in significant morbidity and accounts for 6% of all hospital admissions. Currently, hyaluronate/carboxymethylcellulose represents the major option to prevent adhesion formation after surgery. A novel product, human amniotic membrane (HAM), contains inherent anti-inflammatory properties that should mitigate adhesion formation. We sought to evaluate the rate of adhesion generation after surgical trauma from HAM compared to standard intraperitoneal adhesion barriers.

**Methods/Interventions:** In this double-blinded, prospective evaluation, 30 male Sprague-Dawley rats underwent laparotomy with peritoneal disruption to the cecum and abdominal wall. Animals were randomized to one of three groups ( $n=10$ ): Control, 2x3cm sodium hyaluronate/carboxymethylcellulose (HAC) adhesion barrier, or a 2x3cm HAM adhesion barrier. Animals were sacrificed at 14 days. Independent gross and histological assessments were performed and analyzed between groups using adhesion scoring and microscopy. Scoring was based on percent of the cecum involved (0-4), vascularity of adhesions (0-3), strength (0-3), inflammation (0-3), and fibrosis (0-3).

**Results/Outcome(s):** All rats survived to 14 days and intra-abdominal adhesions were observed in all 30 animals. We observed no fascial dehiscence. There were significantly fewer adhesions in the HAM group (2.3) versus the control (3.2) and HAC (3.1) groups ( $p=0.046$ ). Percent adhesion to the cecum was significantly lower in the HAM (29%) when compared to the HAC (47%) and control (36%,  $p=0.048$ ). Gross adhesion scores were significantly higher in the HAC and control groups with a score of 7.4 and 6.1 out of 10 versus 5.8 in the HAM group ( $p=0.041$ ). Histological examination showed no significant difference between or within the three groups for inflammation or fibrosis. The attached figure gives representative gross and histological examples of the three groups. There were trends of decreased neovascularity as well as adhesion strength in the HAM group. Finally, intraperitoneal inflammation appeared to be decreased in the HAM group as represented by the formation of gastrocecal and enterocecal fistulas that were observed in our control group.

**Conclusions/Discussion:** Human derived amniotic membrane is effective at reducing intraperitoneal adhesion after surgical trauma and is superior to the current anti-adhesion barriers. HAM is well absorbed and demonstrates short-term safety.

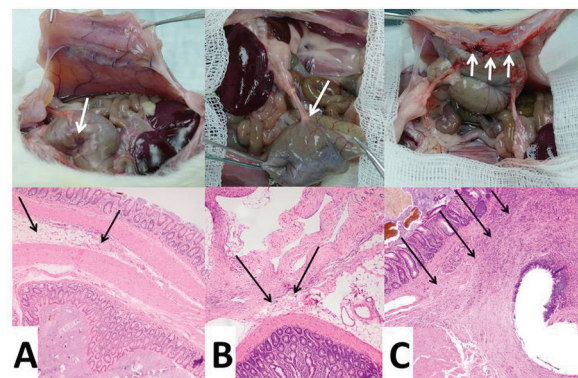


FIGURE: Three columns showing gross and histological imaging of A. HAM cecal to cecal adhesion B. HAC cecal to small bowel and C. Control cecal to abdominal wall. Arrows identify area of adhesions.

## POSTER ABSTRACTS

### ASPIRIN PROMOTES AN EPITHELIAL PHENOTYPE, REDUCES THE STEM CELL POPULATION AND INHIBITS WNT SIGNALLING IN COLORECTAL NEOPLASIA.

PD1

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**Purpose/Background:** Colorectal cancer (CRC) is the fourth commonest cause of cancer deaths worldwide. The role of aspirin in cancer prevention is well-established with aspirin reducing CRC incidence. Recent evidence suggests that aspirin may have post-diagnosis benefits with increased survival rates in CRC patients. Loss of cell-cell junctions and the acquirement of a motile mesenchymal phenotype is facilitated by epithelial-mesenchymal transition (EMT) which is associated with CRC metastasis. Furthermore, EMT can induce a cancer stem cell (CSC) phenotype in tumour cell subsets which display increased therapeutic resistance. A potential mechanism for the post-diagnosis benefit of aspirin is the inhibition of EMT and CSC formation. Understanding the signalling pathways regulating EMT and CSC formation in cancer is important for preventing metastasis and combating therapeutic resistance. Aberrant *Wnt* signalling is an early characteristic in colorectal neoplasia and contributes to EMT and stem cell regulation. Here, we investigate the effect of aspirin on EMT, stem cell population and *Wnt* signalling in CRC cell lines, human familial adenomatous polyposis (FAP) colonic organoids and the *Apc*<sup>Min/+</sup> mouse model.

**Methods/Interventions:** We studied the effect of aspirin on CRC cell line migration and invasion using wound healing and organotypic invasion assays. Differences in markers of motility, EMT and stem cells were evaluated following aspirin treatment using western blotting, immunofluorescence and qRT-PCR. The effects of aspirin on EMT and stem cell markers were also studied in human FAP colonic epithelial organoids and in *Apc*<sup>Min/+</sup> mouse models.

**Results/Outcome(s):** Aspirin inhibited CRC cell migration and invasion. The decreased migration was paralleled by inhibition of RhoA/ROCK1 motility signalling following aspirin. Aspirin increased E-cadherin (epithelial marker) and reduced mesenchymal marker expression in CRC cell lines, human colonic organoids and *Apc*<sup>Min/+</sup> adenomas indicating inhibition of EMT. The characteristic cystic phenotype of “*Wnt*-driven” effects in APC-mutated human and mouse colonic epithelial organoids was rescued by aspirin, which promoted the “budding” phenotype more consistent with wild-type APC alleles. In parallel, aspirin decreased expression of stem cell markers (Lgr5, TROY) in APC-mutated human and mouse colonic epithelial organoids. Aspirin also decreases  $\beta$ -catenin expression and reduced Paneth cell number in *Apc*<sup>Min/+</sup> adenomas.

**Conclusions/Discussion:** Aspirin inhibits cellular migration, invasion, motility and promotes an epithelial phenotype in CRC cell lines. We also show that aspirin rescues the aberrant *Wnt*-driven cystic phenotype in human FAP and mouse adenoma models with a concomitant decrease in stem cell population and *Wnt* pathway inhibition. Our novel findings shed light on potential molecular mechanisms related with increased survival in CRC patients on aspirin post-diagnosis.

### NEAR INFRARED TARGETED COLONOSCOPY FOR THE DETECTION AND REMOVAL OF COLONIC NEOPLASMS.

PD2

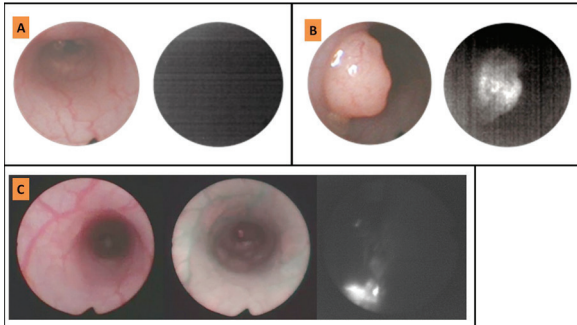
J. Mitchem, J. Amos-Landgraf, M. Lewis  
Columbia, MO

**Purpose/Background:** Colorectal cancer (CRC) affects over 150,000 patients per year. Despite advances in therapy, many patients eventually die of their disease. The most effective means of improving survival is preventing occurrence via screening. With appropriate screening there is an up to 70% risk reduction for the development of CRC. While this is impressive, the adequacy of adenoma detection and removal during colonoscopy is important as adenoma miss rates have been reported up to 20-30%. This clearly demonstrates a need for improved colonoscopic screening. In this study, we use a novel targeted imaging method to enhance polyp detection and removal.

**Methods/Interventions:** An anti- $\alpha$ -actinin-4 peptide (LS301), with excitation in the near infrared (NIR), was used for detection of uptake. A rat colonoscopy system was fitted with a NIR laser to acquire images. Pirc rats harboring a germline APC mutation that develop colon neoplasia were used for colonoscopic imaging. Samples of human normal colon, adenoma, and adenocarcinoma were immunohistochemically stained for expression of  $\alpha$ -actinin-4.

**Results/Outcome(s):** Immunohistochemistry demonstrated increased  $\alpha$ -actinin 4 on the cell surface in human adenomas and adenocarcinomas when compared to normal colon. Thus,  $\alpha$ -actinin 4 is an attractive target for NIR-guided colonoscopy in patients. A rat model of colonic lesion development that mimics human CRC was established using Pirc rats. At age 5 months, lesions were detected in rats on white light colonoscopy. Next, rats were given topical LS301 and NIR colonoscopy was performed providing evidence of increased uptake in polyps when compared to normal mucosa. Rats were then sacrificed and polyps were confirmed at necropsy. Histologically, these polyps harbored adenoma and early adenocarcinoma mimicking human disease. Colonoscopy was well tolerated by the rats and interval lesion progression was clearly detectable.

**Conclusions/Discussion:** This study shows that  $\alpha$ -actinin 4 expression is increased in colorectal neoplasia, and is an attractive target for NIR-guided colonoscopy. This technique is a critical area of need as early detection and removal of polyps prevents cancer development and helps to ensure complete polyp removal, with the potential to allow patients to avoid colectomy.



A) Image depicting normal rat colon with white light colonoscopy and Near-Infrared Imaging (NRI) showing no uptake in the normal colon. B) Colonoscopic image of Pirc rat colon polyp with white light colonoscopy and NRI depicting increased uptake of LS301 in the polyp. C) Image of white light colonoscopy, narrow band imaging, and NRI showing increased uptake LS301 in flat lesion.

### ENDOSCOPIC DECOMPRESSION FOR SIGMOID VOLVULUS: IS IT A PRIMARY TREATMENT OPTION?

PD3

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**Purpose/Background:** Sigmoid volvulus is a life-threatening condition that often affects patients with significant comorbidity. Given the perceived risks associated with definitive surgery, the choice between colonoscopic decompression alone and elective colectomy remains controversial. Currently, outside of several case series, little is known regarding outcomes following endoscopic management alone.

**Methods/Interventions:** The Statewide Planning and Research Cooperative System was queried for all urgent or emergent admissions in which endoscopic decompression was performed for sigmoid volvulus in New York State between 2000 and 2011 using ICD-9 diagnostic and procedure codes. Patients were classified into two groups: endoscopic decompression with subsequent elective colectomy or endoscopic decompression alone. Patients were then retrospectively followed for 3 years, and outcomes were compared between the two treatment groups.

**Results/Outcome(s):** Among 4,204 patients admitted with acute sigmoid volvulus, 19% of patients underwent initial colectomy and 81% underwent initial endoscopic decompression. Of the 89% of patients initially managed successfully with endoscopy, 24% underwent colectomy

and 76% had colonoscopy alone. Recurrent volvulus occurred in 25% of patients who underwent decompression (median=86 days), resulting in 12.4% of patients undergoing subsequent colectomy. Patients with older age, male sex, Medicaid insurance, diabetes mellitus, COPD, renal failure, and admission from nursing home were more likely to have endoscopic intervention. Elective colectomy and colonoscopic decompression alone had a 7.8% and 13.4% 30-day postoperative mortality rate, respectively. 90-day postoperative mortality rates for these procedures were 13.9% and 21.4%. Colonoscopy alone was associated with a 5.5% cause-specific mortality rate within 3 years. Ultimately, patients with increased age and comorbidities had increased likelihood of 30-day and 90-day mortality in both patients treated with elective colectomies and colonoscopic decompression.

**Conclusions/Discussion:** Over half of patients admitted with sigmoid volvulus are currently being managed with colonoscopic decompression alone. While this treatment carries a high recurrence rate, it may be preferable to elective colectomy when comparing mortality rates, emphasizing the importance of careful risk-stratification in this comorbid population.

### PREOPERATIVE ANTI-TNF $\alpha$ THERAPY PREDICTS DEVELOPMENT OF DENOVO CROHN'S DISEASE AFTER ILEAL POUCH-ANAL ANASTOMOSIS FOR ULCERATIVE COLITIS.

PD4

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**Purpose/Background:** One of the most devastating complications of ileal pouch-anal anastomosis (IPAA) for ulcerative colitis (UC) is development of *denovo* Crohn's disease (CD). Medical therapy with anti-TNF $\alpha$  prior to IPAA is increasing. We hypothesized that the incidence of *denovo* CD after IPAA has increased and preoperative anti-TNF $\alpha$  is a risk factor for the rise in the development of CD after IPAA.

**Methods/Interventions:** A single institution, prospectively maintained database was evaluated for patients who underwent IPAA for UC during a 22-year period ending August, 2015. Development of CD, preoperative anti-TNF $\alpha$  use, demographic and disease characteristics were evaluated. The study cohort was divided into 3 periods chronologically based on the date of stoma closure: Study period 1 (1993 to 1999), Study period 2 (2000 to 2007), and Study period 3 (2008 to 2015) and preoperative anti-TNF $\alpha$  use and development of CD were compared between groups. Cox proportional hazards model was used to identify independent risk factors for development of CD. Crohn's disease-free survival was compared using the Kaplan-Meier method and log-rank test.

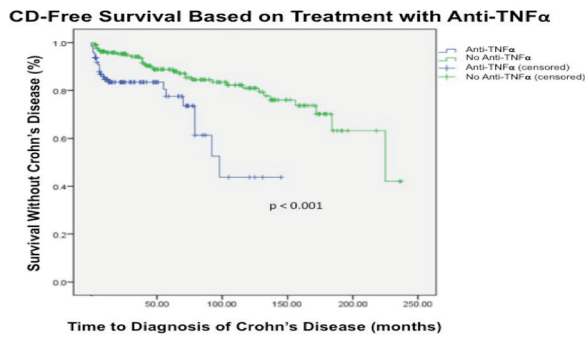
**Results/Outcome(s):** 353 patients undergoing IPAA for UC were identified (179 males; mean age  $38.5 \pm 16.1$  years), of whom 60 (17%) developed CD during a mean follow-up of 47 (range, 3 – 237) months. None of the 71 patients in Study period 1, 38 patients (24%) in Study period 2, and 87 patients (71%) in Study period 3 used preoperative anti-TNF $\alpha$  ( $p < 0.001$ ). Coinciding with the increasing use of anti-TNFs, 11 patients (15.5%) in Study period 1, 31 patients (19.5%) in Study period 2, and 18 patients (14.6%) in Study period 3 developed CD at a mean of  $80.9 \pm 87.6$ ,  $43.6 \pm 40.6$ , and  $16.3 \pm 21.4$  months respectively;  $p = 0.001$ . Mean time to development of CD was also significantly shorter for patients treated with anti-TNF $\alpha$  ( $20.2 \pm 27.2$  months) versus anti-TNF $\alpha$  naïve patients ( $58 \pm 60.4$  months);  $p = 0.002$ . Crohn's disease-free survival was also significantly shorter for patients treated with anti-TNF $\alpha$  ( $p < 0.001$ ) (Figure). Using the cox proportional hazards model, preoperative anti-TNF $\alpha$  use (HR: 2.2, 95% CI, 1.1-4.3;  $p = 0.03$ ) predicted development of CD whereas older age at surgery (HR: 0.98; 95% CI, 0.96-0.99;  $p = 0.01$ ) and surgery during Study period 1

(HR: 0.18; 95% CI, 0.06-0.54;  $p = 0.002$ ) were protective for development of CD.

**Conclusions/Discussion:** Diagnosis of *denovo* CD is occurring at a faster time interval after IPAA. This may partly be explained by increasing preoperative treatment with anti-TNFs, which independently predict the development of *denovo* CD. This may be a reflection of more aggressive disease process in patients treated with anti-TNF $\alpha$  preoperatively, the ability of anti-TNF $\alpha$  drugs to mask CD prior to IPAA, or the development of CD may be fostered by the interaction between anti-TNFs and the microbiome.

**PD3 Bivariate Analysis of Factors Associated with Elective Colectomy vs. Endoscopic Decompression Alone for Sigmoid Volvulus**

	Elective Colectomy (n=743; 24.42%)	Endoscopic Decompression (n=2,300; 75.58%)	P-Value
Age			
< 70	264 (35.5)	684 (30)	<0.0001
65-79	186 (25)	612 (26.6)	
$\geq 80$	293 (39.4)	1004 (43.7)	
Sex			
Male	464 (62.45)	1222 (53.1)	<0.0001
Female	279 (37.6)	1,078 (46.9)	
Race			
White	514 (69.1)	1,568 (68.2)	0.8
Black	138 (18.6)	459 (20)	
Other	70 (9.4)	205 (9)	
Unknown	21 (2.8)	68 (3)	
Medicaid Insurance	290 (39)	1018 (44.3)	0.01
Comorbidities			
Cardiac Disease	96 (12.9)	362 (15.7)	0.06
Diabetes Mellitus	98 (13.2)	429 (18.7)	0.0006
COPD	89 (12)	365 (16)	0.009
Renal Dysfunction	19 (2.6)	149 (6.5)	<0.0001
Elixhauser Comorbidity Score $\geq 2$	311 (41.9)	1075 (46.7)	<0.02
Hospital Academic Status			
Major Academic	284 (38.2)	840 (36.5)	0.55
Non-Academic	459 (61.8)	1460 (63.5)	
Hospital Location			
Urban	698 (93.9)	2,135 (92.8)	0.29
Rural	45 (6.06)	165 (7.17)	
Admission from Nursing Home	39 (5.3)	175 (7.6)	0.02



## LONG-TERM OUTCOMES OF ANAL FISTULA REPAIR WITH LIFT PROCEDURE.

PD5

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**Purpose/Background:** The ligation of the intersphincteric fistula tract (LIFT) procedure has emerged as a popular sphincter-sparing option for the treatment of fistula-in-ano. Previous studies have reported a wide range of success rates. Length of follow-up, local and systemic factors are thought to play a role in the healing and recurrence rates. The purpose of this study was to assess the long-term success rate of LIFT procedure and to determine risk factors that might predict failure.

**Methods/Interventions:** We performed a retrospective review of all 221 patients who underwent 238 LIFT

procedures at three large academic centers from June 2009 to December 2015. Variables collected included age, gender, body mass index (BMI), fistula duration, prior fistula procedures, external opening location, length of the tract, and systemic risks factors for poor healing including diabetes and smoking history. The primary outcome was the rate of healing defined as resolution of symptoms with closure of the external opening at 3 months. Predictive factors for fistula recurrence were analyzed.

**Results/Outcome(s):** The analysis included 221 patients (72% male), while 43 (18%) were lost to follow-up. Mean follow-up was 11.76 ( $\pm 14.9$ ) months and mean age was 45 ( $\pm 12$ ) years. At follow-up, 93 (39%) LIFT procedures healed and 103 (43%) failed to heal. Systemic factors including smoking, diabetes, HIV and obesity were not significant of failure. High fistulas with internal opening above the dentate line failed to heal more often than those at or below the dentate line ( $p=0.036$ ). Fistula characteristics including length of the tract, location of external opening and prior seton placement, were not predictive of healing (Table).

**Conclusions/Discussion:** In this large multicenter patient cohort, long-term success rates following the LIFT procedure were fair and were generally lower than what has been reported in earlier studies. Our results do not support systemic risk factors as predictors of LIFT failure, while fistulas with a high internal opening seem to have an increased risk for failure after LIFT procedure.

### PD5 Fistula characteristics.

	Healed (n=95)	Non-Healed (n=103)	P value
Posterior Fistula IO	35 (38)	36 (35)	0.77+
Posterior Fistula EO	35 (38)	33 (32)	0.45+
Length of Track			
Mean ( $\pm$ SD)	3.7 ( $\pm 1.7$ )	3.4 ( $\pm 1.5$ )	0.30*
Median (range)	3 (2-10)	3 (1-9)	0.45**
Depth of IO			
At or Below dentate line	51 (93)	48 (79)	0.038+
Above dentate line	4 (7)	13 (21)	
Abscess	5 (5)	5 (5)	1.0+
Seton	58 (62)	64 (62)	1.0+
Drain	9 (10)	13 (13)	0.65+
Blind Track	6 (6)	9 (9)	0.60+
Prior repair	13 (14)	23 (22)	0.14+
Fistula Duration (months)			
Mean ( $\pm$ SD)	27.8 ( $\pm 34.6$ )	25.1 ( $\pm 32.5$ )	0.58*
Median (range)	13.7 (1-210)	12.7 (1-156)	0.51**

Categorical variables reported as n (%), continuous variables reported as mean ( $\pm$ SD).

IO=internal opening. EO=external opening.

\*Unpaired t-test, \*\*Mann-Whitney U-test, +Fisher's exact test.



**AUTOLOGOUS MICRO-FRAGMENTED AND MINIMALLY MANIPULATED ADIPOSE TISSUE AS AN INNOVATIVE APPROACH FOR THE TREATMENT OF COMPLEX ANAL FISTULAS: A SAFETY AND FEASIBILITY STUDY.**

PD6

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**Purpose/Background:** The aim of the study is to evaluate the safety and feasibility of using autologous, micro-fragmented and minimally manipulated adipose tissue to promote complex anal fistula healing.

**Methods/Interventions:** From April 2015 to April 2016, fifteen patients affected by complex transfincteric anal fistula were enrolled in the present study. Inclusion criteria were: complex anal fistula confirmed by pelvic magnetic resonance or 3D 360° transanal ultrasound, fistula already drained with a seton from almost 4-6 weeks. Exclusion criteria were: multiple fistula tracts, presence of abscess, inflammatory bowel disease, HIV, HBV or HCV infection, recto-vaginal fistula, therapy with anticoagulants, steroids or immunomodulants, previous pelvic radiotherapy, personal history of neoplasia within 5 years from the diagnosis, pregnancy, uncontrolled diabetes, coagulopathy or connective diseases. Technique: the lower or the lateral abdomen was chosen as donor site for adipose tissue harvesting. The harvested fat was then processed in the Lipogems processing kit, a disposable device that progressively reduces the size of the adipose tissue clusters while eliminating oily substances and blood residues with pro-inflammatory properties. After curettage of the fistula tract, the closure of internal opening was performed through 3/0 PDS stiches and mucosal flap. After this procedure a total 12 cc of processed adipose tissue was injected around the fistula tract and internal opening, using 1 cc syringes. Operative time, intra-operative and postoperative complications were recorded. Follow-up was scheduled at 7 days, 1-3-6-12 months after surgery. The healing of the fistula was defined as the closure of internal and external openings without any discharge.

**Results/Outcome(s):** Fifteen patients (5 males and 10 females) underwent the procedure. The mean operative time was 55 minutes. Median follow-up was 12 months (range 6-12). Recurrence rate was 26.7% (4 patients). It was observed one case of abscess and three cases of persistent discharge without closure of the internal and external openings. No intraoperative or postoperative major complications were recorded. Only two cases of minor abdominal wall hematoma occurred.

**Conclusions/Discussion:** Autologous, micro-fragmented and minimally manipulated adipose tissue is a safe and feasible procedure to promote complex anal fistula healing. Preliminary results of this novel technique are very promising, although a larger number of patients is

required to draw any conclusion about long-term results compared with the other sphincter saving procedures.

**OVERLAPPING AND SLEEVE-LIKE MODIFICATION TO THE MUCOSAL ADVANCEMENT FLAP IMPROVES OUTCOMES.**

PD7

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**Purpose/Background:** Successful outcomes of the mucosal advancement flap as a sphincter sparing treatment for high and complex cryptoglandular fistulas range between 60-80%. The overlapping, sleeve like modification of the mucosal advancement flap is done by creating a flap of mucosa, inclusive of internal spincter, in a *sleeve* like manner and suturing it 1 cm distal to the internal opening (Figures 1&2). A proximal segment of redundant rectal mucosa is then used to *overlap* the flap and the suture line to reinforce the repair (Figure 3). The aim of the present study is to evaluate whether an overlapping, sleeve like modification of the mucosal advancement flap enhances successful outcome in the treatment of high and complex cryptoglandular fistulas.

**Methods/Interventions:** A retrospective review was done on 139 patients who underwent overlapping, sleeve like modification of the mucosal advancement flap by a team of two surgeons at a single institution from 2010 to 2016. All patients had high and complex transsphincteric fistulas, defined as those that encompassed greater than one-third of the external sphincter. Primary outcome is the resolution of the fistula defined as closure of the external opening and cessation of drainage either from the anus or external opening at least three months post procedure. Failure was characterized by persistent drainage through the external opening or the anus or the need for additional surgery. Secondary outcomes include demographics, length of follow-up, and complications related to the procedure. Non-cryptoglandular fistulas and patients with insufficient follow up were excluded.

**Results/Outcome(s):** 139 patients (90% male) with a median age of 42 (range, 19-65) years underwent overlapping, sleeve like mucosal advancement flap. Over a median follow up of 12 (range, 3-18) months, 125 (90%) patients had a successful outcome. Of the 14 patients with recurrences, 4 of them had necrosis of the flap, 3 patients had recurrence with associated ischio-rectal abscess, and the 7 other patients had persistent drainage through the external opening at least 3 months after the procedure. There were no instances of postoperative incontinence.

**Conclusions/Discussion:** The overlapping, sleeve like modification applied to the mucosal advancement flap seems to be associated with higher success rate than the classical mucosal advancement flap technique. We believe that the sleeve like shape of the flap with minimal lateral

incisions risks less blood supply compromise and minimizes stool accumulation under the flap. In addition, the overlapping of proximal redundant rectal mucosa protects the repair, at least for some time, from contact with rectal contents.

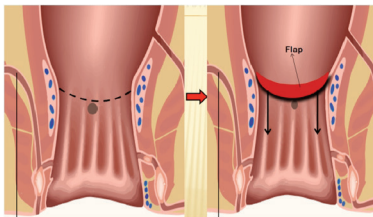


Figure 1: Creation of a rectal flap (mucosa and part of internal sphincter) in a sleeve like manner

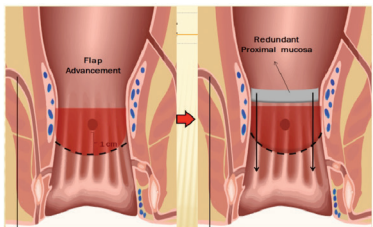


Figure 2: Advancing the rectal flap 1 cm distal to the internal opening. Preparation of redundant proximal rectal mucosa. Note: internal opening ligated with stitch.

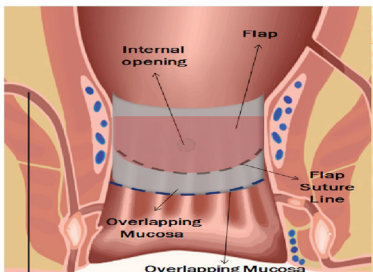


Figure 3: Final result of overlapping and sleeve like mucosal advancement flap technique.

### MULTICENTER PROSPECTIVE SERIES OF SACRAL NERVE STIMULATION FOR FECAL INCONTINENCE IN LATIN AMERICA: INITIAL REPORT.

PD8

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 Weston, FL; Rio de Janeiro, Brazil; Buenos Aires, Argentina; Alvaro Obregon, Mexico; San Juan, PR; Bogota, Colombia; Ciudad de Mexico, Mexico; Cuauhtemoc, Mexico; Fortaleza, Brazil; Parana, Brazil

**Purpose/Background:** Sacral nerve stimulation (SNS) is a widely accepted therapeutic option for patients with fecal incontinence (FI). However, to date, large series have only reported results from developed wealthier countries. Little has been reported regarding the implementation or outcomes of SNS in less developed or less wealthy countries. Thus we aimed to retrospectively evaluate patients with FI who underwent SNS in Latin America. End points evaluated were 1) Cleveland Clinic Florida-Fecal

Incontinence score (CCF-FIS) improvement, and 2) incidence and types of complications.

**Methods/Interventions:** All patients who underwent an SNS procedure after failed conservative management for FI including pelvic floor retraining biofeedback therapy were included for analysis. Patients underwent clinical assessment, with recorded CCF-FIS when available, anal manometry, and endoanal ultrasound. All participating surgeons underwent didactic and hands-on cadaver lab training prior to and proctoring during their initial SNS procedures. Data from all centers were entered into a common database by one surgeon (LO) for statistical analysis.

**Results/Outcome(s):** A total of 131 patients [119 females; mean age of 62.2 (range, 19-87) years] underwent fluoroscopic-guided S3 SNS for FI between 2009-2016 in Latin America. After successful test lead implantation, the SNS stimulator was placed in 129 patients. At a mean follow-up of 36.7 (range, 1-84) months, the CCF-FIS was significantly improved from the preoperative baseline (15.9 to 5.2, respectively;  $p < 0.0001$ ). Complications occurred in 19/129 (14.7%) patients and included infection ( $n=5$ ), persistent implant site pain ( $n=5$ ), generator or lead dislodgement ( $n=5$ ), malfunctioning device ( $n=3$ ) and hematoma ( $n=1$ ). Reimplantation after the first and second stages of the procedure were necessary in 2 (1.5%) and 3 (2.3%) patients, respectively. The device removal rate was 2.2%. Overall, 90% of patients rated their improvement as "significant".

**Conclusions/Discussion:** SNS for FI is safe and efficient when performed by well-trained surgeons, even in less wealthy or less developed countries.

### COMPLETE PATHOLOGICAL RESPONSE AFTER NEOADJUVANT THERAPY IN RECTAL CANCER: DOES YPT0 ALSO MEAN YPN0 ?

PD9

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**Purpose/Background:** Rectal resection after neoadjuvant chemoradiotherapy is the standard of care for adenocarcinoma rectum. Watchful waiting after chemoradiation for rectal cancer, in a select group of patients is the new frontier. Selection of these patients is based on the absence of mucosal disease after neoadjuvant therapy. The quintessential question is whether the absence of mucosal disease also indicates an absence of nodal disease. The objective of this study was to find out if pathological complete response in the rectal wall (ypT0) correlates with pathological complete response of the mesorectum (ypN0).

**Methods/Interventions:** A retrospective, cross-sectional, observational study was done on 458 patients diagnosed to have adenocarcinoma rectum between April 2008 and September 2016. All patients received

neoadjuvant long course radiation therapy of 5040cGy in 28 fractions with concurrent 5 fluorouracil based chemotherapy. Patients underwent rectal resection approximately 8 weeks following surgery. The patients who had complete pathological response in the rectal wall (ypT0) were analysed in this study.

**Results/Outcome(s):** A total of 458 patients were included in the study. Of these patients, 84 patients had no disease in the rectal wall (ypT0). 82 of these patients had no disease in the mesorectum as well and had a complete pathological response (ypT0N0). The pathological complete response rate was 17.9%. 2 patients (2.38%) had node positive disease without having any disease in the rectal wall (ypT0N1). The rest (97.62%) had no tumour either in the rectum or the mesorectum (ypT0N0).

**Conclusions/Discussion:** In patients with pathological complete response, absence of tumour in the rectum correlates well with absence of disease in the mesorectum and absence of nodal disease. Thus absence of mucosal disease can be considered as a surrogate marker of complete response to neoadjuvant therapy. These results may prove to be of significant value in future guidelines detailing the watch and wait philosophy after chemoradiotherapy in patients with locally advanced rectal cancer.

## NATIONAL RATES OF TRANSANAL LOCAL EXCISION FOR STAGE I RECTAL CANCER PERSIST DESPITE DECREASED OVERALL SURVIVAL COMPARED TO STANDARD RESECTION; A NATIONWIDE COHORT STUDY FROM THE NATIONAL CANCER DATABASE.

PD11

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Atlanta, GA

**Purpose/Background:** Previous data from the National Cancer Database from 1989 – 2003 showed increasing rates of transanal local excision (LE) over standard resection (SR) for stage I rectal cancer despite the lack of strong evidence supporting its oncologic adequacy. Understanding patient and tumor specific variables associated with survival are important for patient selection. Our aim was to update recent national trends, compare overall survival (OS), and determine factors associated with OS in patients with stage I rectal cancer undergoing LE or SR.

**Methods/Interventions:** The NCDB is a national retrospective database representing >1500 Commission-on-Cancer accredited institutions and >75% of all US cancer cases. Surgical therapy and outcomes of 15,149 patients in the National Cancer Database with stage I (T1 or T2) rectal adenocarcinoma between 2004 and 2012 receiving either LE or SR was examined over time. Patient demographics, institutional data, tumor characteristics, and survival data were analyzed. Descriptive statistics,

Chi-squared test, and/or Cox proportional hazard model along with Kaplan-Meier method, Log-rank test, and propensity score matching were carried out wherever appropriate.

**Results/Outcome(s):** Of the 15,149 patients included in our study, 11,770 (77.7 %) had SR while 3,379 (22.3 %) had LE. The annual rate of LE for stage I (T1 and T2) rectal cancer remained steady at 22% (20.88 - 24.9%;  $p = 0.077$ ) over the study period. On multivariate analysis controlling for patient and tumor specific factors, the 5-year OS after LE for stage I rectal cancer was less than SR: 76.6% vs. 80.7%;  $p < 0.0001$ . (T1, 80.5% vs. 86%;  $p < 0.001$ ; T2 64.9% vs. 76.1%;  $p < 0.001$ ) by log rank test. A lower 5-year OS after LE compared to SR was maintained with propensity score matching (HR 1.23;  $p < 0.001$ ). Of the 3,379 patients undergoing LE, 502 (15%) had positive margins, while 259 (2.2%) of 11,770 patients undergoing SR had positive margins. Factors associated with decreased overall survival include undergoing LE, positive margins, T2 tumors, tumors > 4 cm, low volume centers, uninsured patients and increasing comorbidities.

**Conclusions/Discussion:** This is the first national study showing a leveling off rather than an increasing utilization of transanal local excision for stage I rectal cancer over the past decade. Even when controlling for patient and tumor specific factors, LE of stage I rectal cancer has a lower 5-year OS when compared to SR. Transanal local excision of stage I rectal cancer should be offered to select patients only after careful consideration of patient factors balanced against the risk of decreased overall survival.

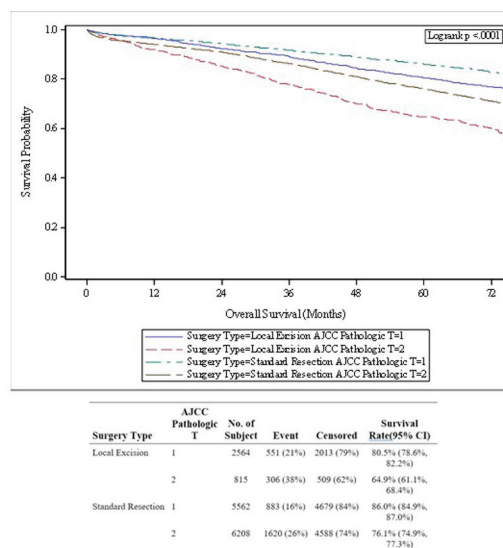


Figure 2. Overall Survival in months of local excision vs standard resection for stage 1 rectal cancer.

### ADDED VALUE IN DISCRIMINATION PERFORMANCE OF TUMOUR PARAMETERS AND NOVEL FEATURES DETERMINED USING ROUTINE PRE-TREATMENT MRI IN PATIENTS WITH ANAL CANCER.

PD12

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**Purpose/Background:** The AJCC TNM staging system is the standard prognostic classification for anal squamous cell carcinoma (ASCC), but is too crude as a personalised discriminator for chemoradiotherapy (CRT) trials, such as UK PLATO, where locoregional failure (LRF) is a key outcome; and has yet to be evaluated at scale using magnetic resonance imaging (MRI). We evaluated the added value in discrimination performance of tumour parameters and novel features determined using routinely performed pre-CRT MRI.

**Methods/Interventions:** We measured tumour size (greatest diameter in cm) – designated mrT - and determined four additional features (patterns of nodal involvement; presence of tumour heterogeneity; extra-mural vascular invasion, EMVI; and sphincter infiltration) in pre-treatment staging MRIs from 191 patients with canal ASCC undergoing CRT with curative intent at a single centralised treatment centre in the United Kingdom (2007 to 2014). Assessors were blinded to the primary outcome measure of LRF. There was good intra- and inter-observer concordance for all parameters except sphincter infiltration. Associations between MRI-derived parameters and LRF were evaluated within Cox regression models. Discrimination performance was summarised using area under the curve ( $ROC_{AUC}$ ) estimates and compared with that for AJCC TNM.

**Results/Outcome(s):** With a median follow-up of 39 months, there were 36 LRFs (actuarial 3-year LRF rate: 19.5%). By T stage (T1, 5; T2, 103; T3, 42; T4, 41), the actuarial 3-year LRF rates were 0%, 8.9%, 30.2% and 38.4%, respectively. The  $ROC_{AUC}$  for the TNM staging model was 0.70 (95% CI 0.61 – 0.78). The  $ROC_{AUC}$  values were higher for T stage models which also incorporated additional MRI features (0.74, 95% CI 0.67 – 0.82) and higher still in the mrT size model (0.78, 95% CI 0.71 – 0.83), although the confidence intervals overlapped substantially. Nodal pattern was significant in univariable models (Hazard ratio for N3 versus N0: 3.46, 95% CI 1.39 – 8.59,  $p = 0.008$ ), but not in multivariable models. The novel features of presence of tumour heterogeneity and EMVI added modestly to the discrimination performance of the model. Broadly, similar findings were observed for secondary outcomes of overall survival, cancer-specific survival and failure from distant metastases.

**Conclusions/Discussion:** The current TNM system in ASCC provides sub-optimal prognostic discrimination to inform personalised treatment. In this cohort, MRI-derived T size is the key driver of loco-regional failure. The use of mrT size as standard terminology for pre-treatment staging and treatment planning may thus be preferred. External validation of our findings is currently underway in an independent setting.

### IS THE PATHOLOGIC RESPONSE OF T3 RECTAL CANCER TO NEOADJUVANT HIGH-DOSE-RATE ENDORECTAL BRACHYTHERAPY COMPARABLE TO EXTERNAL BEAM RADIOTHERAPY?

PD13

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Montreal, QC, Canada

**Purpose/Background:** Endorectal brachytherapy is an attractive option in the neoadjuvant setting for locally advanced rectal cancer, but is not considered standard of care. The purpose of this study was to compare the pathologic outcomes of patients with clinical T3 rectal cancer who underwent high-dose-rate endorectal brachytherapy (HDREBT) to those who underwent conventional external beam radiotherapy (EBRT).

**Methods/Interventions:** After institutional review board approval, all patients from 2007-2016 identified as having a clinical T3 rectal adenocarcinoma based on MRI staging and who were treated with neoadjuvant therapy followed by total mesorectal excision were identified from a prospective, single-institution database. All pre-treatment MRI's were reviewed prospectively by a blinded gastrointestinal radiologist. Tumor response, defined as pathologic downstaging in T and/or N stage, was compared between patients who underwent neoadjuvant HDREBT and EBRT. A baseline risk score for tumor response was modeled using variables a priori established with this outcome, and included pre-treatment nodal status, tumor distance from anal verge, pre-treatment carcinoembryonic antigen (CEA) levels, and time from treatment to surgery. The effect of radiation technique was then assessed in a multivariate regression model.

**Results/Outcome(s):** Ninety-nine patients were identified as having a T3 rectal cancer based on blinded pre-treatment MRI review. The median age was 67 years (Q1-Q3 59-75) and 59 patients (59.6%) were male. Thirty-one patients were clinically node negative (31.3%), 46 had c-N1 disease (46.5%) and 22 had c-N2 disease (22.2%). Sixty-four patients (64.6%) underwent HDREBT and 35 patients (35.4%) underwent EBRT. The HDREBT group had a lower median mesorectal depth of invasion (4mm (Q1-Q3 2-7) vs. 5mm (Q1-Q3 4-13),  $p=0.01$ );

all other pre-operative tumor characteristics were similar, including distance from anal verge, tumor location and node positivity. In total, 18 patients (18.2%) achieved a pathologic complete response – 12 in the HDREBT group and 6 in the EBRT group (18.8% vs. 17.1%,  $p=NS$ ). Sixty-eight patients (68.7%) were pathologically downstaged – 48 in the HDREBT group and 20 in the EBRT group (75.0% vs. 57.1%,  $p=NS$ ). On regression analysis, after accounting for mesorectal depth of invasion and the patient's baseline risk score, radiation technique did not have a significantly different impact on tumor response ( $p=0.15$ ). However, HDREBT was superior to EBRT for T downstaging (59.4% vs. 28.6%,  $p=0.003$ ) but not for N downstaging (35.9% vs. 51.4%,  $p=0.14$ ).

**Conclusions/Discussion:** Neoadjuvant treatment of T3 rectal cancers with HDREBT appears to achieve equivalent overall pathologic downstaging and superior T downstaging compared to conventional EBRT.

### PERITONEAL INVOLVEMENT IS MORE COMMON THAN NODAL METASTASES IN PATIENTS WITH HIGH-GRADE APPENDIX TUMORS AND APPENDICEAL ADENOCARCINOMA.

PD14

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Basingstoke, United Kingdom

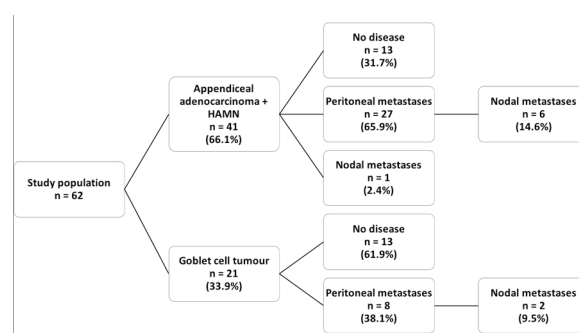
**Purpose/Background:** Right hemicolectomy is recommended in patients with histological findings of high-grade appendix (HGA) tumour after appendicectomy to establish accurate nodal staging. Prior experience suggests undetectable peritoneal disease may be encountered at surgery and further microscopic spread may not be addressed adequately with just a right hemicolectomy. In HGA tumours with radiologically detectable disease complete cytoreduction may not be possible and outcomes poor. For these reasons we adopted a policy of “prophylactic” CRS and HIPEC, including right hemicolectomy, for HGA tumours without obvious metastatic spread.

**Methods/Interventions:** Retrospective analysis of prospectively collected data in a high-volume Peritoneal Malignancy Institute (January 1994 – September 2016). Patients referred with histologically high-grade appendix tumours at appendicectomy without detectable metastatic spread were identified.

**Results/Outcome(s):** All 62 patients with high-grade pathology at appendicectomy, without clinical or radiological peritoneal disease, underwent “prophylactic” CRS and HIPEC with complete cytoreduction. As shown in the Figure, 35/62 (57%) had peritoneal disease (median PCI 5; range 1 – 28). 14/35 had microscopic peritoneal disease and 7/14 had microscopic disease distant from the right

colon and caecal pole. 9/62 (15%) had nodal involvement; 8/9 had synchronous peritoneal and nodal disease. Mean overall (OS) and disease-free (DFS) survival was 110.9 (95%CI: 94.8 – 127.0) and 102.1 (95%CI: 84.3 – 119.9) months with 5-year OS and DFS of 83.2% and 76.0%.

**Conclusions/Discussion:** Complete cytoreduction was achieved in all patients with excellent long-term survival. The incidence of peritoneal spread (57%) compared with nodal involvement (15%) supports CRS and HIPEC as definitive treatment rather than “prophylaxis” in patients with HGA tumours, even without radiologically detectable disease. High-grade appendix tumours benefit from early aggressive operative management to deal with potential peritoneal and nodal spread and should be referred for CRS and HIPEC.



### COLORECTAL MULTIDISCIPLINARY TUMOR CONFERENCE CHANGES PATIENT MANAGEMENT.

PD15

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**Purpose/Background:** The utility of multidisciplinary tumor conferences (MTCs) is still debated. Colorectal MTCs discuss a diverse range of cases, in terms of both tumor type and clinical context (initial presentation, follow-up discussion after additional work-up, and post-operative discussion for pathology review and adjuvant treatment consideration). We hypothesized that colorectal tumors, by their nature of multimodality treatment, would benefit from MTC input.

**Methods/Interventions:** All weekly colorectal MTCs between July 2015 and June 2016 were prospectively monitored and the presenting physicians completed a uniform written survey at the end of the meeting. Patient clinical and pathological information, the management plan prior to the MTC, and the change in management (if any) as a result of the MTC, were recorded. Groups were compared using Chi-Square.

**Results/Outcome(s):** 758 cases involving 591 patients with malignancies of colorectal origin were discussed. Utility surveys were obtained for 671 (88.5%) cases.

Among the cases surveyed, the final diagnosis was colon cancer in 184 (27.4%), rectal cancer in 371 (55.3%), and “other” malignancies in 116 (17.3%; including anal SCC, carcinoid, GIST). 377 (56.2%) were initial discussions, 87 (13.0%) were follow-up discussions, and 207 were postoperative discussions (30.8%). MTC discussion changed management in 152 cases (22.8%). More specifically, management change was more common following initial discussions (N=110 [29.2%]) and follow-up discussions (N=30 [34.5%]), compared to postoperative discussions (N=12 [5.8%]) ( $p<0.001$ ). Colon cancer case discussions were less likely to result in change of management (N=25, [13.6%]) compared to rectal (N=97, [26.1%]), and “other” malignancies (N=30, [26.3%]) ( $p<0.001$ ). Change in management was not significantly more common among patients with metastatic disease (36/132 [27.3%],  $p=0.20$ ), nor recurrent disease (27/82 [32.9%],  $p=0.20$ ). There was also no variation based on surgeon experience: change in management occurred in 21.0%, 23.3% and 20.4% of cases presented by surgeons with <10, 10-20, and  $\geq 20$  years of experience respectively ( $p=0.57$ ).

**Conclusions/Discussion:** Colorectal MTC discussions change management for nearly one quarter of cases presented, with rectal cancer and more rare cases accounting for the majority of changes. Most changes were done at the initial management discussion when decisions are crucial. Management was less likely to be changed for postoperative cases, where care paths and guidelines are normally followed. Despite questions regarding the utility of tumor boards, CRC MTC provides useful information and guides patient care.

#### RECTAL CANCER SURGERY IN THE UNITED STATES: DEFINING A YEARLY NUMBER OF CASES A SURGEON SHOULD PERFORM TO OPTIMIZE PATIENT OUTCOMES.

PD16

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**Purpose/Background:** The surgeon volume–outcome association has been established for rectal resections for cancer in smaller studies; however, a threshold number of cases defining a “high-volume” surgeon remains unclear. Moreover, no study has addressed the volume–outcome at the national level. Our aim was to determine the number of rectal cancer operations per surgeon per year associated with optimal outcomes.

**Methods/Interventions:** Adults undergoing low anterior resection and abdominoperineal resections for cancer were identified from the Health Care Utilization Project-National Inpatient Sample (1998–2009). Multivariate logistic regression with restricted cubic splines was utilized to examine the association between the number of annual

total proctectomies per surgeon and risk of complications, mortality, length of stay and hospital charges.

**Results/Outcome(s):** Results: Among 32,377 patients undergoing rectal cancer operations, 58% were male, 91% had their surgery in urban hospitals, 68% in large hospitals, 52% in teaching hospitals. The rate of sphincter preservation was 72%. Median annual surgeon volume was 4 cases; 21% of surgeons performed 1 case/y and 61% of surgeons performed 5 or less cases per year. The overall mortality rate was 1.3%, morbidity was 35%, median length of stay was 7 days and hospital charges \$30,323. After adjustment, perioperative mortality decreased with increasing surgeon volume up to 20 cases/y before plateauing ( $P < 0.001$ ). Intraoperative organ injury showed a curve with near plateauing at 20 cases/year. Similarly, the curves for intraoperative vascular injury and hemorrhage, length of stay, and sphincter preservation all seemed to plateau at 20 cases/y. Overall morbidity was the only outcome that showed a linear relationship with decreasing rates with increasing surgeon-volume without plateauing. After adjustment, patients undergoing surgery by high-volume surgeons (>20 cases/y) had a lower mortality by 28%, lower morbidity by 19%, shorter length of stay by 1.5 days, hospital charges lower by \$11,045 (all  $p<0.001$ ). Only 7% of surgeons performed more than 20 cases per year.

**Conclusions/Discussion:** This is the first study to identify a surgeon-volume threshold (>20 rectal cancer operations/y) that is associated with improved patient outcomes. Identifying a threshold number of cases defining a high-volume rectal surgeon is important, as it has implications for quality improvement, criteria for referral, creation of centers of excellence and reimbursement.

#### CAN LOW VOLUME SURGEONS ACHIEVE HIGH QUALITY OUTCOMES WITH INCREASING USE OF LAPAROSCOPIC COLECTOMY?

PD17

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**Purpose/Background:** Higher surgical volume and use of laparoscopy are both associated with improved outcomes in colectomy patients at the institutional level yet the interaction of these factors at the surgeon level has not been studied. Specifically, high volume caseloads correlate with higher use of laparoscopy but it is unknown whether low volume surgeons have the ability to improve outcomes by adopting laparoscopy. Therefore, we sought to evaluate the relationship between proportional use of laparoscopy and postoperative outcomes, for high and low volume surgeons, in patients undergoing elective colectomy for colon cancer.

**Methods/Interventions:** We performed a retrospective analysis of patients who underwent elective resection for

colon cancer using data from the University HealthSystem Consortium from 2012 to 2015. We analyzed data on preoperative patient characteristics (patient demographics, severity of illness) and postoperative complications. Individual surgeons were divided into four categories for comparison – low volume/low percentage laparoscopy (LVLL), low volume/high percentage laparoscopy (LVHL), high volume/low percentage laparoscopy (HVLL), and high volume/high percentage laparoscopy (HVHL). The “high” and “low” volume/percentage were defined as the top and bottom tercile for each group, respectively. Multilevel logistic regression models were conducted to assess postoperative outcomes for surgeons, accounting for hospital effects, with LVLL surgeons as the referent category.

**Results/Outcome(s):** A total of 23,912 patients and 355 surgeons were included in this study. 28.4% were LVLL, 27.0% were LVHL, 22.3% were HVLL and 22.3% were HVHL. Surgeons who perform a low percentage of laparoscopy (LVLL and HVLL) care for patients with a greater severity of illness ( $p < 0.001$ ). After adjustment for severity of illness and other potential confounding factors, surgeons who perform a high percentage of laparoscopy (LVHL and HVHL) had a lower rate of complications compared with LVLL surgeons (LVHL odds ratio [OR] 0.63, 95% CI 0.48, 0.83; HVHL OR 0.67, 95% CI 0.55, 0.81). There was no statistical difference in complications between LVLL and HVLL surgeons (HVLL OR 0.83, 95%

CI 0.69, 1.00) or between LVHL and HVHL (HVHL OR 1.06, 95% CI 0.83-1.36).

**Conclusions/Discussion:** Surgeons who perform higher proportion of laparoscopic colectomy, regardless of overall case volume, are less likely to have postoperative complications. Focused efforts at increasing proportional laparoscopic caseload in low colectomy volume surgeons may improve patient outcomes, making them comparable to high volume surgeons.

#### POSTTRAUMATIC STRESS DISORDER IN PATIENTS WITH FAMILIAL ADENOMATOUS POLYPOSIS: A CAUSE FOR CONCERN.

PD18

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**Purpose/Background:** Posttraumatic Stress Disorder (PTSD) can develop after a traumatic event. About 7 or 8 out of every 100 people will have PTSD at some point in their lives. To meet criteria for PTSD individuals must have experienced an event in which there was actual or threatened serious injury or loss of life. Although physical violence and danger are most commonly associated with PTSD, medical trauma could also be a trigger. Familial adenomatous polyposis (FAP) guarantees abdominal surgery with a high risk of disease and surgery-related

#### PD18 Psychosocial symptoms in Patients with Familial Adenomatous Polyposis

Patients with PTSD/PPTSD with symptoms as a fraction of all patients with symptoms	Symptoms	Percentage of symptoms accounted for by patients with PTSD/PPTSD
8/10	Guilt	80%
3/6	Shame	50%
5/8	Denial	62%
6/6	Suicidal Thoughts	100%
10/19	Depression	53%
5/11	Hopelessness	45%
6/8	Isolation	75%
8/15	Stigma/embarrassment	53%
13/33	Anxiety	39%
9/33	Fear	27%
9/26	Body Image Issues	34%
4/7	Emotional numbing/apathy	57%
8/11	Social Anxiety	72%
7/12	Loneliness	58%
5/5	Worthlessness	100%
10/15	Social Withdrawal	67%
6/8	Prolonged sadness	75%
9/19	Emotional fatigue	47%
8/21	Feeling overwhelmed	38%

complications. We hypothesized that FAP could be associated with PTSD. If this is the case, there are important implications for adequate and holistic patient care.

**Methods/Interventions:** We constructed an anonymized online mental health survey for patients with FAP. Questions included the 4 symptoms of PTSD: 1. re-experiencing symptoms, 2. avoiding symptoms 3. hyperarousal symptoms, and 4. negative changes in beliefs and feelings (other psychosocial symptoms). These questions were used as a screen. Patients with positive answers to 4/4 were defined as having PTSD. Patients with 3 of 4 were deemed "Partial PTSD" due to the limits of the administration of the survey and potential lack of understanding one's psychological responses. Other survey questions were analyzed according to PTSD status. Quality of life (QOL) was measured on a 7 point scale from the very worst (1) to the very best (7). The survey was sent online to all FAP patients enrolled in the local registry.

**Results/Outcome(s):** 79 patients completed the questionnaire: 22 had no psychosocial symptoms at all; 57 did (72.2%). 9 patients fitted the definition of PTSD (11.4%) and 8 had partial PTSD (10.1%). Patients with PTSD had an average of 9.3 psychosocial symptoms each, compared to 8.3 for PPTSD and 2.3 for non PTSD designated patients ( $p < 0.05$ ). The two patient groups assigned a PTSD status (PTSD, PPTSD) make up a significant percentage of all those who endorsed psychosocial symptoms from the total survey sample of 79 patients (table). 6/79 FAP patients endorsed suicidal thoughts, all of whom had PTSD. Average QOL was 4.6 for PTSD patients, 5.3 for PPTSD and 4.9 for non PTSD (not significant)

**Conclusions/Discussion:** FAP patients with PTSD are severely affected by psychosocial symptoms and need professional counseling. This is an unmet need in many centers caring for patients with FAP and is essential in comprehensive treatment for FAP patients. In particular, the correlation between FAP patients with PTSD and suicidal ideation is an important point for further exploration and research.

#### INCREASED LEAK RATES AFTER STAPLED VERSUS HANDSEWN ILEOCOLIC ANASTOMOSIS IN PATIENTS WITH COLON CANCER: A NATIONWIDE COHORT STUDY.

PD19

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**Purpose/Background:** Data on anastomotic leak (AL) rates after stapled versus hand-sewn ileocolic anastomosis are conflicting. In a 2011 Cochrane review, summarizing 7 studies, the combined estimate was in favor of the stapled technique. In contrast, recent cohort studies from Sweden, Spain and Denmark found a two-fold increase in AL with the stapled approach. The 2015 European Society

of Coloproctology cross-sectional study confirmed this finding. The purpose of the present study was to investigate AL rates following stapled versus hand-sewn ileocolic anastomosis in a nationwide cohort.

**Methods/Interventions:** This nationwide retrospective cohort study included all Danish patients undergoing right hemicolectomy for cancer between October 2014 and December 2015. Data were obtained from the database of the Danish Colorectal Cancer Group (DCCG) and the National Patient Registry. Primary outcome was AL rate and secondary outcomes were management of AL and 30-day mortality. Covariates included demographics, comorbidity, tumor stage and surgical variables. Multivariable logistic regression and propensity score matching were used to adjust for potential confounding.

**Results/Outcome(s):** A total of 1414 patients were included, 391 (28%) in the stapled group and 1023 (72%) in the hand-sewn group. Forty-five patients (3.2%) developed AL, 21/391 (5.4%) in the stapled group compared with 24/1023 (2.4%) in the hand-sewn group,  $P = 0.004$ . Time to AL was median 7 days (IQR 4.5 – 11 days) with no difference between stapled and hand-sewn patients. In the multivariable analysis the stapled versus hand-sewn technique was associated with increased risk of AL (adjusted OR = 2.91, 95% CI 1.53-5.53),  $P < 0.001$ , which was confirmed after propensity score matching (OR = 2.41, 95% CI 1.24-4.67,  $P = 0.009$ ). Additional risk factors for AL were tobacco use (adjusted OR = 2.22, 95% CI 1.14-4.34),  $P = 0.020$ . Six of 45 patients with AL were subjected to salvage of the anastomosis with no differences between stapled and hand-sewn patients. Thirty-day mortality was 7/45 (15.6%) in patients with AL compared with 29/1369 (2.1%) in non-AL patients,  $P < 0.001$ . There was no difference between the stapled and hand-sewn approach.

**Conclusions/Discussion:** The present study demonstrated a more than two-fold increase in AL after stapled versus hand-sewn ileocolic anastomosis. This striking finding adds to the increasing amount of data suggesting higher AL rate with the stapled approach. Previous opinions on the optimal anastomosis technique in the colon cancer setting should therefore be scrutinized given the devastating short-term outcome of AL.

#### OUTCOMES OF STAPLED SIDE-TO-SIDE ILEOCOLIC ANASTOMOSIS: IS IT DEPENDENT ON TECHNIQUE OR SURGEON GRADE AND SPECIALISATION?

PD20

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**Purpose/Background:** Stapling is increasingly used as an alternative to hand sewn bowel anastomosis. The significance of technique of stapling and training in stapling is not known. The technique for ileocolic anastomosis is



mostly side to side anastomosis with a liner cutter and there is debate about whether the ends of the bowel should be stapled across with another linear cutting or a non-cutting stapler. We analysed the outcomes of stapling from the European Society of Coloproctology (ESCP) Right hemicolectomy cohort study.

**Methods/Interventions:** The ESCP prospective cohort study was undertaken over a two-month period in 2015 and 3208 patients undergoing a right hemicolectomy were included from 284 hospitals from 39 countries. The dataset included patient demographics, indication for surgery including the grade of surgeon and details about the technique of anastomosis including the types of staplers used. The primary endpoint included both clinical/radiological confirmed anastomotic leaks and intra-abdominal/pelvic collections.

**Results/Outcome(s):** Stapled anastomosis was undertaken in 1858 patients and included 1347 stapled side to side ileocolic anastomosis using a linear cutting stapler. There was no difference ( $p=0.8$ ) in leak rates between patients with apical linear cutting stapled 8.42% ( $n=1003$ ) and 7.96% ( $n=346$ ) apical non-cutting stapled anastomoses. There was no difference in leak rates if the stapled end was oversewn or not in each group. Leak rates were significantly higher for general compared to colorectal surgeons ( $p=0.0210$  after adjustment for centre effect).

**Conclusions/Discussion:** There is no difference in leak rates between using a linear cutting or non-cutting stapler for the apical end of a stapled sided to side anastomosis after right hemicolectomy. The higher leak rates for general surgeons suggest that overall familiarity with stapling may be more relevant than the exact technique and the possibility that the case mix of general surgeons may include a greater proportion of high risk, out of hours, emergency cases.

## NONSTEROIDAL ANTI-INFLAMMATORY DRUGS AND ANASTOMOTIC LEAKAGE AFTER COLORECTAL SURGERY: A META-ANALYSIS.

PD21

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**Purpose/Background:** Enhanced recovery after surgery protocols supports the postoperative use of nonsteroidal anti-inflammatory drugs (NSAIDs) to minimize the use of opioids after colorectal surgery. However, there is an increasing concern on the impaired wound healing of anastomosis associated with NSAID use, potentially leading to a higher risk of anastomotic leakage.

**Methods/Interventions:** A literature search was conducted using the MEDLINE, PubMed, Cochrane Library and Clinicaltrial.gov (April 1975 - October 2016). Studies identified were appraised with standard selection criteria. Data points were extracted and meta-analysis was performed based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).

**Results/Outcome(s):** Thirteen studies, seven retrospective studies and six randomized controlled trials (RCTs), comprising of 23,508 patients were examined. The analysis of all studies showed a significantly lower rate of anastomotic dehiscence in those who did not receive NSAIDs (pooled odds ratio (OR)=0.59, 95% confidence interval (CI)=0.44-0.80;  $Z=3.39$ ,  $P=0.0007$ ) with statistical heterogeneity ( $I^2=61\%$ , *Cochran Q*=28.52,  $P=0.003$ ). Interestingly, the analysis of RCTs did not demonstrate a significant difference in anastomotic leaks between two groups (pooled OR=0.48, 95%CI=0.17-1.32,  $Z=1.42$ ,  $P=0.16$ ) without any heterogeneity ( $I^2=0\%$ , *Cochran Q*=1.33,  $P=0.86$ ). In subgroup analysis, *non-selective NSAIDs and use of diclofenac were associated with a higher risk of anastomotic dehiscence* (pooled OR=0.54, 95% CI=0.43-0.67,  $Z=5.41$ ,  $P<0.00001$ ; pooled OR=0.39, 95% CI=0.28-0.55,  $Z=5.35$ ,  $P<0.00001$  respectively) without any heterogeneity ( $I^2=0\%$ , *Cochran Q*=3.19,  $P=0.87$ ;  $I^2=0\%$ , *Cochran Q*=0.97,  $P=0.61$  respectively). In contrast, there was no difference in the incidence of anastomotic leakage between no NSAID group and selective NSAID group, as well as between no NSAID group and use of ketorolac (pooled OR=0.43, 95%CI=0.13-1.42,  $Z=1.39$ ,  $P=0.17$ ; pooled OR=0.71, 95%CI=0.35-1.43,  $Z=0.96$ ,  $P=0.34$  respectively) but it did show a significant heterogeneity when comparing selective NSAID group with the control group ( $I^2=68\%$ , *Cochran Q*=9.50,  $P=0.02$ ).

**Conclusions/Discussion:** Use of NSAIDs after colorectal surgery may be associated with a higher risk of anastomotic leakage. It is important to balance between the benefits of faster postoperative recovery and potential adverse effects of NSAIDs on anastomosis. Selective NSAIDs may be safer than non-selective ones. More RCTs are warranted to further evaluate the relationship between anastomotic leakage and use of NSAIDs, especially selective ones.

### PD20 Leak rate by surgeon grade and specialisation

Grade of surgeon	Leak rate %	Number of patients
Colorectal surgeon	7.06	836
Colorectal surgery resident	6.98	172
General surgeon	13.07	199
General surgery resident	10.71	140

## STATINS MITIGATE THE RISK OF SEPSIS AND ANASTOMOTIC LEAKS AFTER COLORECTAL SURGERY.

PD22

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**Purpose/Background:** Statins have pleiotropic properties that are thought to potentially protect against postoperative complications related to sepsis after colorectal surgery. Studies to date reveal inconsistent results with respect to the protective effect of statin use in the perioperative period. The purpose of this study was to determine the effects of statins on colorectal postoperative complications related to sepsis in a large protocol-driven prospective database.

**Methods/Interventions:** The Michigan Surgical Quality Collaborative database was queried for all patients who underwent elective colorectal resection from June 2012 through July 2015. Demographic information, intraoperative data, and postoperative outcomes were identified. Primary endpoints were anastomotic leak, composite surgical site infection (SSI), sepsis, and 30 day mortality. Standard outcomes were analyzed using multivariate logistic regression and propensity score adjustments using matched and weighted samples.

**Results/Outcome(s):** A total of 7285 patients met inclusion criteria: 2515 (34.5%) received statins and 4770 (65.5%) did not receive statins. Statistical differences in patient characteristics are shown in Table 1. For the combined colon and rectal surgery study group, statin therapy reduced the risk of sepsis (OR 0.712, 95% CI .535, .948],  $p=0.020$ ). Subgroup analysis of patients having rectal resections revealed that statin therapy reduced the risk of anastomotic leak (OR 0.260, 95% CI [.112, .605],  $p=0.002$ ) and sepsis (OR 0.510, 95% CI [.303, .858],  $p=0.011$ ). Both propensity score approaches supported the finding of reduced sepsis in the combined colon and rectal surgery study group although the weighted propensity analysis failed to reach statistical significance ( $p=0.072$ ). The reduced anastomotic leak rate in the rectal surgery group was also seen in both propensity score models, though the results were significant only in a one-tailed test. There was no significant difference between those taking statins and those not on statin medications with respect to composite SSI (OR 0.908, 95% CI [.701, 1.176],  $p=0.461$ ), or 30 day mortality (OR 0.679, 95% CI [.382, 1.206],  $p=0.187$ ).

**Conclusions/Discussion:** Statin medications decrease the risk of sepsis after colorectal surgery and reduce the risk of anastomotic leak after rectal resection. Further prospective studies are needed to confirm these results and identify patient populations that would benefit most from statin therapy.

Distribution of Covariates by Statin Use

Covariate	Statins - No (n=4770)	Statins - Yes (n=2515)	p-value
Age, Mean (SD)	59.204 (14.404)	68.194 (10.5)	<0.001 *
BMI, mean (SD)	28.549 (7.531)	29.87 (6.376)	<0.001 *
Male Gender n(%)	2081 (44)	1230 (49)	<0.001 *
White Race n(%)	4031 (85)	2141 (85)	0.673
Smoker n(%)	1096 (23)	428 (17)	<0.001 *
Diabetes n(%)	562 (12)	859 (34)	<0.001 *
Hypertension n(%)	1967 (41)	1966 (78)	<0.001 *
Beta Blocker n(%)	864 (18)	1150 (46)	<0.001 *
CHF n(%)	12 (0)	17 (1)	0.011 *
COPD n(%)	371 (8)	283 (11)	<0.001 *
Sleep Apnea n(%)	455 (10)	435 (17)	<0.001 *
Bleeding Disorder n(%)	97 (2)	109 (4)	<0.001 *
Cancer n(%)	143 (3)	52 (2)	0.024 *
DVT n(%)	216 (5)	175 (7)	<0.001 *
Hypoalbuminemia n(%)	196 (4)	98 (4)	0.707
Weight Loss n(%)	158 (3)	66 (3)	0.122
ASA Classification n(%)			<0.001 *
ASA 1 or 2	2691 (56)	781 (32)	
ASA 3	1962 (41)	1566 (62)	
ASA 4	117 (2)	168 (7)	
Comorbidity, mean (SD)	1.144 (1.313)	2.437 (1.543)	<0.001 *

BMI: Body Mass Index, CHF: Congestive Heart Failure, COPD: Chronic Obstructive Pulmonary Disease, ASA: American Society of Anesthesiology. \*Significant difference,  $p < 0.05$

Outcomes Based on Statistical Approach

Outcome	Linear Regression		Propensity Score Matching		Propensity Score Inverse Weighting	
	OR [95% CI]	P-Value	OR [95% CI]	P-Value	OR [95% CI]	p-Value
All Patients						
Anastomotic Leak	0.789 [0.536, 1.161]	0.227	0.824 [0.534, 1.270]	0.380	0.807 [0.519, 1.254]	0.339
SSI	0.908 [0.701, 1.176]	0.461	0.867 [0.637, 1.179]	0.360	0.836 [0.624, 1.120]	0.230
Sepsis	0.712 [0.535, 0.948]	0.020*	0.628 [0.450, 0.876]	0.006*	0.712 [0.491, 1.031]	0.072
30 Day Mortality	0.679 [0.382, 1.206]	0.187	0.809 [0.621, 1.054]	0.118	0.569 [0.290, 1.114]	0.100
Rectal Resections						
Anastomotic Leak	0.260 [0.112, 0.605]	0.002*	0.409 [0.162, 1.034]	0.059	0.394 [0.137, 1.130]	0.083
SSI	1.010 [0.673, 1.515]	0.963	1.326 [0.778, 2.259]	0.300	0.946 [0.587, 1.527]	0.823
Sepsis	0.510 [0.303, 0.858]	0.011*	0.349 [0.181, 0.671]	0.002	0.457 [0.215, 0.972]	0.0420*
Colon Resections						
Anastomotic Leak	1.119 [0.713, 1.756]	0.628	0.980 [0.591, 1.625]	0.938	1.022 [0.610, 1.712]	0.933
SSI	0.858 [0.613, 1.202]	0.375	0.810 [0.550, 1.191]	0.285	0.830 [0.582, 1.184]	0.304
Sepsis	0.849 [0.599, 1.203]	0.357	0.856 [0.578, 1.270]	0.440	0.836 [0.559, 1.250]	0.383

SSI: Surgical Site Infection. \*Significant difference,  $p < 0.05$

## HUMAN MICROBIOME ANALYSIS OF ANASTOMOTIC TISSUE IN PATIENTS WITH ANASTOMOTIC LEAKS: A POTENTIAL ROLE FOR ENTEROCOCCUS.

PD23

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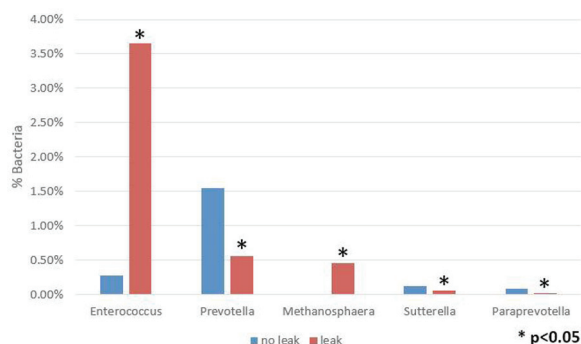
**Purpose/Background:** To develop a microbiome analytical pathway for anastomotic tissue and to profile the human microbiome in anastomotic tissue in patients undergoing colorectal surgery.

**Methods/Interventions:** Patients at a single-institution undergoing distal colorectal operations with a planned primary anastomosis were prospectively enrolled. All patients underwent preoperative oral antibiotic and mechanical bowel preparation. All patients received a colorectal anastomosis. The proximal and distal tissue "donuts" from an end-to-end anastomotic stapling device were collected and used for microbiome analysis. Microbes from donuts were removed from the tissue by washing with Cary/Blair media; the microbial DNA was isolated from the wash using a Fecal DNA isolation kit (Zymo). PCR primers were used to prepare a 16S rRNA gene V4 region amplicon library. PCR products were purified with gel electrophoresis, quantified and sequenced using Illumina NextGen MiSeq platform. 16S DNA sequences were processed, integrated, analyzed using the QIIME program and reported using in-house software. Taxonomy was assigned to 16S sequences using ribosomal database

program classifier against the Greengenes 16S rRNA database. Taxonomic comparisons were made between patients with clinical leak and no leak.

**Results/Outcome(s):** Twelve patients were included which yielded 12 anastomoses and 24 total anastomotic donuts. 11 of the 12 patients underwent a sigmoidectomy; the majority were performed laparoscopically (75%). Indications included diverticular disease (58%), colorectal cancer (33%), and inflammatory bowel disease (8.3%). All anastomotic tissues were successfully processed and profiled by 16S rDNA microbiome analysis. Two of the 12 patients were post hoc diagnosed with an anastomotic leak. On comparison, 43 microbes were identified to be significantly different (according to a Kruskal-Wallis analysis of variance) between the leak and no leak patient with 5 of the most abundant microbes at the genus-level shown in Figure 1. Compared to the no leak group, genus *Enterococcus* in the leak group was 10-fold more abundant (3.6 vs 0.27%,  $p < 0.05$ ).

**Conclusions/Discussion:** *Enterococcus* was observed to be significantly more abundant in patients with a postoperative anastomotic leak compared with no leak. These findings support studies in rodent models that show higher amounts of enterococcus in anastomotic leaks. Our study also provides a process and model for evaluating the microbiome of intestinal anastomosis in humans after colorectal surgery. Further investigation into the potential role of *Enterococcus* in anastomotic leaks needs to be evaluated.



## A COMPARISON BETWEEN LAPAROSCOPIC AND OPEN HARTMANN REVERSAL - RESULTS OF A MULTICENTER STUDY.

PD24

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**Purpose/Background:** The advantages of laparoscopic colorectal surgery have been previously demonstrated. Hartmann reversal however may be a challenging procedure with notoriously reported high rates of conversion. The aim of this study is to compare between open and

laparoscopic techniques for Hartmann reversal in order to evaluate the benefits of minimally invasive surgery.

**Methods/Interventions:** A retrospective-cohort analysis of all patients who underwent Hartmann reversal from 5 medical centers between January 2004 and June 2015 was conducted. Medical charts were reviewed and patient data was analyzed to compare pre, intra and postoperative outcomes.

**Results/Outcome(s):** Two hundred and sixty patients underwent Hartmann reversal surgery. Seventy six patients (29.3%) were operated laparoscopically with a conversion rate of 26.3% (20 Patients). There were no significant differences in preoperative patients' characteristics including gender ( $p=0.785$ ), mean age ( $p=0.521$ ), BMI ( $p=0.948$ ), average Charlson index score ( $p=0.667$ ), cause for Hartmann procedure (neoplastic vs. non-neoplastic,  $p=0.644$ ) and in average time from the original Hartmann procedure to reversal ( $p=0.688$ ) between patients operated laparoscopically and those operated in an open technique. No significant differences were seen in early postoperative outcomes between the two groups, including overall complication rate ( $p=1$ ). There were no significant differences in the rates of anastomotic leak ( $p=0.76$ ), postoperative ileus ( $p=0.68$ ), rates of minor ( $p=1$ ) and major ( $p=0.67$ ) complications according to the Clavien – Dindo classification, length of stay ( $p=0.52$ ) and mortality rate ( $p=1$ ). More intraabdominal abscess were seen in the laparoscopic group ( $p < 0.02$ ) and a trend towards more wound infections was noted in the open surgery group ( $p=0.07$ ).

**Conclusions/Discussion:** The results this multicenter series suggest that laparoscopy did not offer any advantage over an open approach for Hartmann reversal.

## LONG-TERM OUTCOMES OF ACUTE DIVERTICULITIS IN SOLID ORGAN TRANSPLANT PATIENTS.

PD25

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**Purpose/Background:** Optimal management of acute diverticulitis in solid organ transplant (SOT) recipients is increasingly debated. The aim of this study was to determine outcomes of acute diverticulitis in SOT patients.

**Methods/Interventions:** After institutional review board approval, patients with kidney, liver, pancreas, heart and combined transplants who presented with acute diverticulitis between 1985-2014 at a single tertiary care hospital were identified from a prospectively maintained database. Patient demographics, Charlson comorbidity index (CCI), details regarding the index episode of diverticulitis, and outcomes were collected. Descriptive statistics were performed.

**Results/Outcome(s):** Of 2,998 SOT recipients, 29 patients had one or more episode of acute diverticulitis requiring hospital admission with a median follow up of 65 (1-187) months. The mean age was 47 ( $\pm 14$ ) years, 76% ( $n=22$ ) were male and the mean CCI was 3.8 ( $\pm 0.75$ ). All patients were taking immunosuppressants and/or steroids at the time of the index diverticulitis episode and the subsequent attacks. 11/29 (38%) patients presented with uncomplicated diverticulitis; all were successfully treated with antibiotics and expectant management with no plans for elective resection. Of these, 7 (64%) had one or more recurrence(s); 6 were successfully treated with conservative management, while 1 patient had 3 recurrences and underwent an uncomplicated elective resection. 18/29 (62%) patients initially presented with complicated diverticulitis. For the index episode, 10 patients with Hinchey I-II diverticulitis were successfully managed with initial nonoperative treatment and 8 patients with Hinchey II-IV underwent emergency surgery including 7 Hartmann procedures and 1 washout and drainage. Of those patients with initial nonoperative management, 6 had successful expectant management, 1 underwent an uncomplicated elective resection, and 3 underwent a Hartmann procedure for a complicated recurrence. Of the 10 patients who underwent an operation, 4 suffered major perioperative complications (2 drained pelvic abscess, 1 acute renal failure, and 1 intra-operative cardiac arrest). Five patients (50%) ultimately underwent colostomy reversal with one patient suffering an anastomotic leak. No patients experienced graft failure as a complication of diverticulitis.

**Conclusions/Discussion:** After successful nonoperative management of an index episode of uncomplicated diverticulitis in SOT patients, it appears safe to continue with expectant nonoperative management. Patients with an initial presentation of Hinchey III-IV diverticulitis will require emergency surgery with significant morbidity. However, patients with Hinchey I-II diverticulitis who were managed with successful initial nonoperative management have a significant risk of emergency surgery with morbidity for a recurrence and may benefit from an interval elective resection.

## COLLABORATIVE MULTISITE ENHANCED RECOVERY IMPLEMENTATION FOR COLORECTAL SURGERY WORKS.

PD26

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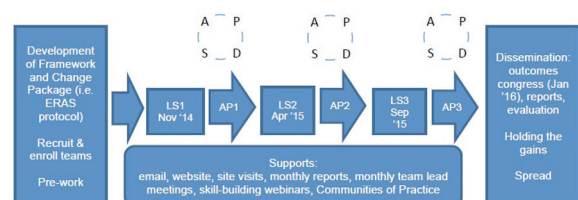
**Purpose/Background:** Enhanced Recovery (ERAS) programs incorporate evidence based, multi disciplinary strategies to improve clinical outcomes after surgery. While in principle wide scale implementation is possible, there is limited information on implementation strategies and their ability to leverage meaningful change in clinical

outcomes through ERAS programs for colorectal surgery at a multisite, multicentre level. The aim of this study is to query whether an IHI Breakthrough Series Model based Collaborative can leverage multicentre, multisite change.

**Methods/Interventions:** Based on the IHI Breakthrough Series model, a multidisciplinary, multistakeholder collaborative was fashioned. The focus was on creating cross site learning, teaching, sharing of resources and tools to develop a network of ERAS clinicians to aid implementation. The IHI model allowed the collaborative to implement changes quickly in multiple organizations. Sequential periods of learning sessions followed by action cycles allowed for stage wise implementation and quality improvement across a broad network of hospitals. All patients undergoing elective abdominal colorectal surgery were included. Data collection and management tools were provided to sites to collect baseline and post-implementation data. Primary outcome measures were length of stay, 80% compliance to 22 ERAS elements and complications. Readmissions and participant experience were also measured. The implementation period was from January to December 2015.

**Results/Outcome(s):** 11 sites across British Columbia participated. Participating sites were diverse, ranging from small community hospitals to large tertiary hospitals in urban settings. Baseline outcomes data was gathered for 999 patients, with post-implementation data available for 1123 patients. Through the implementation cycle, length of stay decreased from 7 to 5 days (median). Complications based on NSQIP definitions were reduced from 32% to 22%. Compliance to the 22 ERAS elements improved drastically. Prior to the implementation, the 11 sites were compliant with 3 processes of care. By the end of the implementation, compliance exceeded adherence targets for 10 processes of care, with a > 25% increase for 8 more processes. Readmissions, not a primary outcome measure, did not increase over the period of intervention. > 90% of participants felt the Collaborative model aided implementation of ERAS protocols and pathway elements in a faster and easier way than if done independently. > 90% felt the pathway was successful and worth the time and effort.

**Conclusions/Discussion:** ERAS programs can reduce length of stay and complications after colorectal surgery at a broader health system level. Implementation is possible, and likely accelerated from a provider perspective through a IHI Breakthrough Series Model based collaborative. Wider spread of ERAS programs is possible across a wide array of hospital sizes through a multisite, multidisciplinary collaborative model.



The Breakthrough Series: IHI's Collaborative Model for Achieving Breakthrough Improvement. IHI Innovation Series white paper. Boston: Institute of Healthcare Improvement; 2003

## MAJOR ABDOMINAL SURGERY FOR BENIGN COLORECTAL DISEASE IMPROVES PATIENT-REPORTED QUALITY OF LIFE.

PD27

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**Purpose/Background:** Patient-reported outcomes on health status and quality of life (QOL) can be used to assess medical and surgical interventions. Limited data are available on these outcomes for patients with benign colorectal disease undergoing elective major abdominal surgery. The objective of this study was to assess the impact of surgery on QOL for benign colorectal patients.

**Methods/Interventions:** Patients with benign colorectal disease including ulcerative colitis (UC), Crohn's disease and diverticulitis were surveyed on pre- and post-operative health status between 2012 and 2016. Included patients underwent an elective major abdominal operation in the form of a small or large bowel resection or a pelvic pouch procedure. Outcomes were assessed after placement on the surgical wait list and 6 months after surgery. Survey instruments consisted of a general health outcome questionnaire (EQ-5D index, max score 1.0) including an overall health status visual analog scale (VAS, max score 100), a pain assessment tool (PEG-3, max score 10), and a depression questionnaire (PHQ-9, max score 27). Pre- and post-operative scores were compared using paired samples t-tests.

**Results/Outcome(s):** Fifty-seven patients completed both pre- and post-operative surveys. The majority of patients (93%) did not have any additional comorbidities. Patients with Crohn's disease (N=16) experienced the greatest pre-operative reductions in QOL and highest pain and depression scores. Average scores improved significantly on all survey instruments following surgery for the total patient cohort (see table). EQ-5D scores, VAS scores and PEG-3 scores improved significantly for the Crohn's and diverticulitis (N=30) patients, but not the UC patients (N=11). Depression scores also improved significantly following surgery for the Crohn's patients.

**Conclusions/Discussion:** Surgical intervention for benign colorectal disease improves patients' reported health status and QOL. Improvements are most pronounced for patients with Crohn's disease and diverticulitis, which may be due to symptom burden prior to operative intervention. Surgery for ulcerative colitis may not result in significant improvements in health status outcomes as measured by the EQ-5D, PEG-3 or PHQ-9 tools.

## THE EFFECT OF MOBILISATION ON SMALL BOWEL TRANSIT TIMES: A PILOT STUDY USING CAPSULE ENDOSCOPY.

P1

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**Purpose/Background:** Factors influencing gastrointestinal motility is of particular interest to general and colorectal surgeons in the post-operative setting. Both post-operative and paralytic ileus can cause complications such as malnutrition and electrolyte disturbances, as well as significant patient discomfort. Ileus also cause significant discomfort to patients and is a major contributor to prolonged length of stay. Enhanced recovery protocols usually include early mobilisation in the belief that this may encourage the return of normal bowel function. However, there are no previously published studies with objective outcomes to support this belief. This study had two aims: whether it was feasible to compare small bowel transit times using capsule endoscopy, and to compare the effect of mobility versus bed rest on small bowel and gastric transit times, measured by capsule endoscopy.

**Methods/Interventions:** Approval from the local ethics committee was granted. Fifty-four consecutive adults underwent a clinically indicated capsule endoscopic examination within a tertiary hospital endoscopy unit. Nineteen subjects were prospectively recruited into the study and instructed to remain at rest for a four hour period after swallowing the wireless capsule (inactive group). Thirty-four patients, who had been instructed to resume normal daily activities for the same period, formed the control group (active group). All patients underwent the same bowel preparation prior to the procedure. Demographic and clinical data, as well as gastric and small bowel transit times, measured using Mirocam wireless capsule

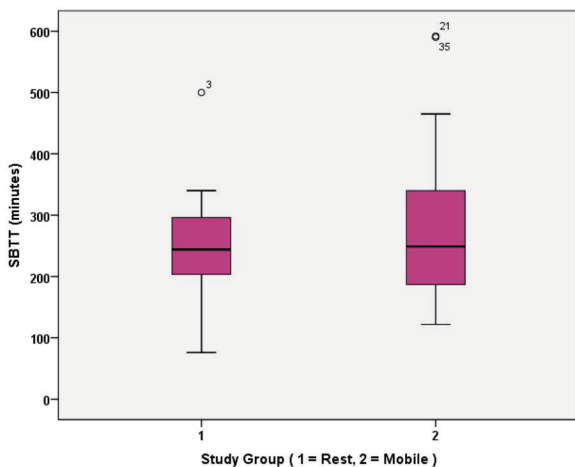
PD27 Pre- and post-operative health status scores for patients with benign colorectal disease

Health Status Survey Instrument	Pre-operative score (mean ± standard deviation)	Post-operative score (mean ± standard deviation)	p-value
EQ-5D (/1.0)	0.78 ± 0.19	0.85 ± 0.17	0.004
VAS (/100)	66.93 ± 19.69	76.20 ± 18.02	0.001
PEG-3 (/10)	2.85 ± 3.05	2.00 ± 2.35	0.020
PHQ-9 (/27)	5.25 ± 5.43	3.86 ± 4.42	0.016

endoscopes (IntroMedic, Seoul, South Korea), were collected from patients and statistically analysed.

**Results/Outcome(s):** Both groups had similar numbers of male patients (55% vs 45%,  $p=0.38$ ), and were similar in median age (59.2 years vs 55.4 years,  $p=0.42$ ). Indications for capsule endoscopy were not significantly different. There was no significant difference in total small bowel transit time (SBTT) between subjects in the active group and the inactive group, with median times (standard deviation) being 249 vs 244 mins,  $p=0.59$  (Figure 1). The gastric transit time was also not significantly different (35 mins vs 37 mins,  $p=0.60$ ).

**Conclusions/Discussion:** In this pilot study, patient mobilisation did not decrease either the SBTT or GTT, placing some doubt on the concept that early mobilisation might decrease the incidence and/or length of ileus. We did find that it was feasible and safe to use capsule endoscopy to measure small bowel transit times. Limitations of this study include its small size and use of normal, rather than post-operative patients. Further studies are required to investigate whether gastric and small bowel transit times are decreased with early mobilisation after major abdominal surgery.



## BIOCHEMICAL ASSESSMENT OF PERITONEAL INFLAMMATION AND THE IMPACT OF HEATED HUMIDIFIED CARBON DIOXIDE (CO<sub>2</sub>) DURING LAPAROTOMY FOR COLORECTAL RESECTION: A RANDOMIZED CONTROLLED TRIAL.

P2

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**Purpose/Background:** During laparotomy for colonic resection, the abdominal content and peritoneum is exposed to cold, dry air. Laparoscopic studies have demonstrated inflammatory damage to the peritoneum with the use of cold dry gas insufflation. The aim of this study was to determine if inflammation occurred within the peritoneum

during open colorectal surgery. The study also aimed to determine if the use of warmed humidified CO<sub>2</sub> during laparotomy reduced peritoneal inflammation.

**Methods/Interventions:** A randomised controlled trial was performed at Concord Hospital from February 2013 to December 2016. Eligible patients were older than 18 years of age, undergoing elective open colorectal resection. Patients were randomised to receive either humidified (RH: 100%), warmed (37°C) CO<sub>2</sub> insufflation into the abdominal cavity (study group) or receive standard laparotomy without gas insufflation (control group). Parietal peritoneal samples were taken at the start and at the end of the operation in each group. The samples were analysed for inflammatory cytokines using ELISA. The oxidative stress on the peritoneum was also analysed using mass spectrometry to calculate the halogenation of tyrosine with in the peritoneum.

**Results/Outcome(s):** Forty patients were randomised with 20 patients receiving warmed, humidified CO<sub>2</sub>, and 19 patient receiving standard laparotomy. One patient withdrew from study prior to surgery. Procedures included hemicolectomy, abdomino- perineal resection, and pelvic exenteration. In all 39 patients, levels of inflammatory cytokines, including interleukins (IL) 1,2,4,6,8,10,13,15,17 increased significantly at the end of the operation. Most notably, IL1 increased 2.1-fold, ( $p=0.0091$ ), IL2 6.0-fold ( $p=0.0006$ ), IL4 2.4-fold ( $p=0.0211$ ), IL5 3.0-fold ( $p=0.002$ ), IL6 134.2-fold ( $p=0.0005$ ), IL 8 13.8-fold ( $p=<0.0001$ ) and IL10 8.3-fold ( $p<0.0001$ ). Interferon, tumour necrosis factor and IL12 levels remained unaltered. When the two groups were compared, the use of humidified, warmed CO<sub>2</sub> resulted in a lower-fold increase for all measured cytokines, and reached statistical significance for IL2 ( $p=0.0419$ ), and IL4 ( $p=0.0413$ ). Assessment of 3-chlorotyrosine as a marker for peritoneal oxidative stress by liquid-chromatography coupled with mass spectrometry showed that the control group exhibited 3.4-fold higher tyrosine chlorination. (1.29 vs 0.37,  $p=0.0364$ ).

**Conclusions/Discussion:** This study demonstrates that peritoneal inflammation occurs as a result of laparotomy. Use of humidified, warmed CO<sub>2</sub> appears to suppress the inflammatory and oxidative response within the peritoneum. This may have clinical outcomes with regards to recovery during the early postoperative period and also oncological outcome.

**“IF YOU WANT TO IMPROVE, BE CONTENT TO BE THOUGHT FOOLISH AND STUPID”: THE LIFE AND CAREER OF DR. HENRY LYNCH.**

P3

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**Purpose/Background:** In an era when research funding is scant and healthcare systems are having difficulty identifying models of reimbursement for physicians that account for research, educational, and clinical productivity, true physician-scientists are becoming rare commodities. Dr. Henry Lynch, through his dogged determination in advancing the understanding of cancer genetics and an uncompromised compassion for his patients, is the embodiment of a true “triple-threat” physician. The purpose of this presentation is to discuss the unique, circuitous and perhaps serendipitous path that led to the prolific career of Dr. Lynch and his contributions to the field of medicine.

**Methods/Interventions:** Through interviews with, and stories from colleagues, co-workers, and family members of Dr. Lynch, as well as his own recollection of events, a chronology of the life and career of the geneticist will be depicted.

**Results/Outcome(s):** Analysis of the chronology of events demonstrates how the presence of some very specific personality traits have led to the life and career successes of Dr. Lynch. With a strong educational background in psychology, genetics, and medicine, perhaps none were better equipped than Dr. Lynch to bear the cancer genetics torch from a knowledge perspective. More important to his successes and advances however, were characteristics and traits, some innate, some nurtured, that allowed him to push his interests ahead. When critics from the NIH widely panned and mocked his contention that some forms of cancer may be heritable, it was the grit and determination he gained as a professional boxer (known as “Hammerin’ Hank”) that propelled him forward. When research funding had long run dry because of the lack of acceptance of his hypotheses, it was his confidence, creativity and resourcefulness that allowed him to continue - the same traits he used, forging paperwork to enter the military at age 16. After 30 years of meticulous note-taking, painstakingly pouring over one family pedigree after another, vindication for his assertions finally came with the boom of the world of molecular genetics.

**Conclusions/Discussion:** Far ahead of his time, Dr. Henry Lynch demonstrated the qualities and characteristics throughout his career that physician-scientists should aspire to and seek to emulate. An exemplary researcher, teacher, and clinician, Dr. Lynch has ascended to this level through persistence and dedication to his craft, an unwavering desire to serve, and the motivation to advance the field of medicine.

**THE ROLE OF ASPARAGINE SYNTHETASE IN COLORECTAL CANCER WITH MUTATED KRAS.**

P4

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**Purpose/Background:** Oncogenic KRAS mutation is the signature event in colorectal cancer (CRC). A number of clinical trials have shown that KRAS mutations in CRC can predict a lack of responses to the anti-epidermal growth factor receptor (EGFR)-based therapy. Therefore, the development of new therapy for CRC with mutated KRAS has been desired clinically. Recently, metabolic change caused by mutated KRAS has gained considerable attention as a novel therapeutic target. Our purpose is to investigate how mutated KRAS can coordinate the metabolic shift to sustain CRC tumor growth and whether metabolic enzymes associated with mutated KRAS could be novel therapeutic targets for CRC with KRAS mutations.

**Methods/Interventions:** We used paired isogenic human CRC cells that differ only in the mutational status of KRAS gene to investigate the metabolic alterations caused by KRAS mutations. First, we measured intracellular metabolites in KRAS-isogenic cell lines using capillary electrophoresis time-of-flight mass spectrometry (CE-TOFMS). Second, we screened the expression of metabolic enzyme by quantitative reverse transcription polymerase chain reaction (qRT-PCR). We also examined the relationship between mutated KRAS and metabolic enzymes using 93 clinical CRC samples.

**Results/Outcome(s):** Metabolomics analysis indicated that KRAS mutation caused alteration in amino acid metabolism: a marked decrease in aspartate level and an increase in asparagine level. Using several human CRC cell lines and clinical CRC specimens, we found that the expression of asparagine synthetase (ASNS), an enzyme that synthesizes asparagine from aspartate, was upregulated by mutated KRAS, and that ASNS expression was induced by KRAS-activated signaling pathway, in particular PI3K-AKT-mTOR pathway. Importantly, ASNS knockdown suppressed cell growth under the glutamine-free condition *in vitro* and asparagine addition could rescue the inhibited growth and viability of cells grown under the glutamine-free condition *in vitro*. Notably, a pronounced growth suppression of KRAS-mutant CRC cells was observed upon ASNS knockdown *in vivo*. Furthermore, the inhibitory effect L-asparaginase (L-Asp), an FDA-approved drug widely used to treat acute lymphoblastic leukemia (ALL), was significantly higher in ASNS-knockdown cells than in the control cells *in vitro*. We also showed that combination of L-Asp plus rapamycin markedly suppressed the growth of KRAS-mutant CRC cells *in vivo*, although treatments using each drug showed no or marginal effect.

**Conclusions/Discussion:** These results suggested the possibility that KRAS-mutant CRC become adaptive to tumor environment through asparagine biosynthesis by ASNS. ASNS might be a novel therapeutic target against CRCs with mutated KRAS.

#### A PROSPECTIVE MULTI-CENTERED ANALYSIS OF THE RECTAL CANCER MUCOSAL MICROBIOME DURING NEOADJUVANT LONG COURSE CHEMORADIOTHERAPY.

P5

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**Purpose/Background:** There is growing evidence that the gut microbiome modulates patient response to chemotherapy and radiotherapy. However, it is unclear how these therapies modify anatomically discrete regions of mucosal ecology during therapy. We therefore applied a 16S rRNA gene sequencing approach to study the meta-taxonomy of the mucosal microbiome in patients undergoing neoadjuvant therapy for rectal cancer.

**Methods/Interventions:** A prospective, observational multi-centred study was performed in patients undergoing elective surgery for colorectal tumors at three teaching hospitals in London, UK and Pilsen, Czech Republic. All patients received bowel preparation prior to surgery. Clinical meta data on therapy was prospectively collected. Tissue from on tumor, and from normal mucosa at 10cms were sampled and snap frozen at -80°C. DNA was extracted from mucosal samples using the PowerLyzer PowerSoil DNA Isolation Kit (MO BIO) and the V1-2 regions of the 16S rRNA gene sequences were sequenced on the Illumina MiSeq platform. Data were analysed by Mothur to determine OTU abundance per sample and were further analysed in Stamp and R.

**Results/Outcome(s):** 49 patients with rectal cancer were recruited (28 men, 21 women; median age 68, range 35-86). Cancers were staged as 1 T1, 13 T2, 27 T3 & 8 T4; 27 N0, 12 N1, 8 N2; 47 M0, 2 M1. 22 patients received neo-adjuvant treatment (9 combined chemoradiotherapy, 5 chemotherapy alone, 8 radiotherapy alone). Chemotherapy included FOLFOX (five patients), 5-fluoruracil alone (two patients) and capecitabine (six patients). Inter-individual variation in gut microbiomes was large, and no significant differences were seen in Chao richness or Shannon diversity indices between neo-adjuvant treated and untreated samples. Faecalibacterium (an important modulator of gut homeostasis through its production of short chain fatty acids) was under-represented in samples from patients who received

radiotherapy and Lachnoanaerobaculum was under-represented in samples from patients who received chemotherapy (both  $p < 0.01$ ). Allprevotella was only seen in a group of patients who received chemotherapy ( $p < 0.001$ ).

**Conclusions/Discussion:** The rectal cancer microbiome is highly individualised. However, neo-adjuvant cytotoxic therapy and long course chemoradiotherapy (LCRT) caused treatment specific changes in the mucosal gut microbiota, which may influence treatment response and toxicity. Future trials are now warranted to explore this further, and research should investigate the molecular mechanisms through which the microbiome modifies therapeutic efficacy of LCRT in rectal cancer.

#### PARADOXICAL PROGNOSTIC IMPACT OF PERIPHERAL BLOOD LYMPHOCYTES BEFORE NEOADJUVANT CHEMORADIOTHERAPY FOR RECTAL CANCER.

P6

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**Purpose/Background:** Neoadjuvant chemoradiotherapy (CRT) has become the standard procedure to downstage locally advanced rectal cancer prior to surgery. Immunological reactions are reported to play an important role in the regression of irradiated rectal cancer. The aim of this study was to assess how the levels of peripheral blood lymphocytes prior to CRT may affect the response to CRT and disease recurrence.

**Methods/Interventions:** A total of 42 consecutive patients diagnosed with primary rectal cancer were prospectively enrolled in our study, and received neoadjuvant CRT followed by curative resection. The numbers of T lymphocyte subsets (CD3+ T lymphocyte, CD4+ helper T lymphocyte, CD8+ cytotoxic T lymphocytes) in the peripheral blood prior to CRT were analyzed using flow-cytometry. Patients were classified into high (Hi-R) and low (Lo-R) response groups based on their pathological response to CRT, and a correlation between pre-CRT lymphocytes and CRT response or disease recurrence was assessed.

**Results/Outcome(s):** Compared with the Lo-R patients, Hi-R patients had significantly higher numbers of CD3+ T lymphocytes ( $p = 0.001$ ) and CD4+ helper T lymphocytes ( $p = 0.002$ ) in their peripheral blood prior to CRT, suggesting that circulating immunity plays an important role in tumor regression during CRT. Based on the receiver operating characteristic curve for the numbers of T lymphocytes prior to CRT, the optimal cut-off value was 1196/mL, with 77.8% sensitivity, and 75.0% specificity. However, in multivariate analysis, high numbers of circulating T lymphocytes prior to CRT was an independent risk factor for shorter disease-free survival ( $p = 0.0358$ , HR=5.86, 95% CI=1.13-34.5).



**Conclusions/Discussion:** In patients with rectal cancer, high levels of circulating T lymphocytes were indicative of a good response to CRT; however, high levels of circulating T lymphocytes also correlated with a high recurrence rate after surgery. Therefore, the role of circulating immunity in CRT remains unclear and requires further investigation.

## INTRATUMORAL GENOMIC HETEROGENEITY AND CLONAL EVOLUTION IN METASTATIC RECTAL CANCER.

P7

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**Purpose/Background:** Rectal cancer is a leading cause of cancer-related morbidity and mortality in the United States. Intratumoral genomic heterogeneity (i.e., diversity in the frequency of specific mutations within an individual tumor) and clonal evolution (i.e., branching patterns of evolution, driven by the emergence of key mutations) are novel concepts in cancer genomics. Recently, the presence of intratumoral genomic heterogeneity in colon cancer was demonstrated in a study of five patients. Whether rectal cancers also exhibit intratumoral genomic heterogeneity is not well characterized. This pilot study was undertaken to identify the presence of genomic heterogeneity within primary and metastatic lesions, and of clonal evolution between primary and metastatic lesions in patients with rectal cancer.

**Methods/Interventions:** We obtained paired tissue samples from primary and metastatic lesions in patients with rectal cancer from our institutional tumor bank. Formalin-fixed paraffin-embedded (FFPE) specimens were macro- or micro-dissected for tumor-rich sections. Next generation sequencing (NGS) was performed with the TruSeq cancer panel (Illumina) to examine mutational hotspots within 48 genes commonly associated with cancer pathogenesis. Sequencing data were analyzed with NextGENe software (SoftGenetics) and with a pipeline using the Integrative Genomics Viewer platform. This project was approved by the Columbia University Institutional Review Board.

**Results/Outcome(s):** Due to the expense of NGS, we limited our analysis to six matched pairs of primary and metastatic lesions. Five metastases were hepatic, and 1 was ovarian. Half of the patients were female; median age was 57.5 years (range, 38 – 61 years). Somatic mutations were identified most frequently in *TP53* (present in 4 primary and 5 metastatic lesions), *APC* (in 2 primaries and 3 metastases), and *KRAS* (in 1 primary and 2 metastases). Additional mutations were identified in *CDH1*, *PIK3CA*, and *SMAD4*. Evidence for intratumoral heterogeneity (as demonstrated by >10% difference in frequency of variant alleles) was present in 3 of the primary tumors, and in 4 of the metastatic lesions. Evidence of clonal evolution from

the primary to the paired metastasis (as demonstrated by the emergence of novel mutations, or by a difference in variant nucleotide frequency between primary and paired metastasis) was found in 4 of 6 cases. Mutations identified *de novo* in metastases included nucleotide variants in *APC*, *KRAS*, *PIK3CA*, and *TP53*. Results of sequencing analysis and inferred phylogeny for an individual case (patient B) are illustrated in figure 1.

**Conclusions/Discussion:** This pilot study demonstrates that rectal cancers exhibit genomic heterogeneity and clonal evolution. Such polyclonality may result in differential response to systemic therapy. Further study is warranted to determine whether the presence of genomic heterogeneity is a useful biomarker for response to systemic therapy.

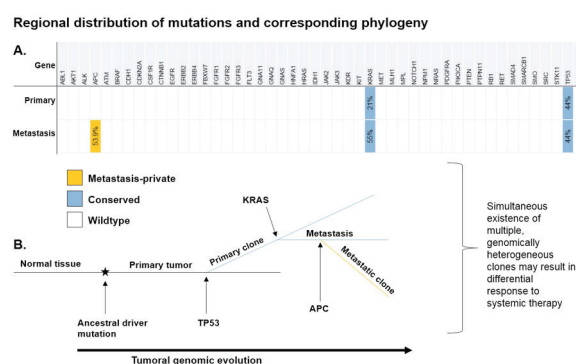


Figure 1. (A): mutational heat map for an individual case (patient B), illustrating the distribution of somatic mutations detected with the TruSeq cancer panel. Colors correspond to whether the given mutation was detected in only the metastasis (metastasis-private), or in both the primary lesion and the metastasis (conserved). No mutation was detected in the majority of genes sequenced (i.e., wildtype). Percentages indicate the frequency of specific variant alleles across all sequencing reads. (B): schematic illustrating the phylogenetic relationship implied by the distribution of mutations in (A). Potential driver mutations, identified by arrows, are acquired by the new branch. Conserved mutations likely occurred early in tumoral evolution, before the development of metastasis, whereas metastasis-private mutations likely emerged after the divergence of those clonal populations. The simultaneous existence of multiple, genomically heterogeneous clones may result in differential response to systemic therapy.

## ANALYSIS OF THE EFFECT OF SINGLE NUCLEOTIDE POLYMORPHISMS ON AGE OF ONSET OF COLORECTAL CANCER IN PATIENTS WITH LYNCH SYNDROME (HEREDITARY NONPOLYPOSIS COLORECTAL CANCER).

P8

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**Purpose/Background:** Lynch Syndrome (LS) is an inherited cancer predisposition syndrome. Patients develop colorectal cancer at a young age but age of onset of disease

can be wide ranging. Single nucleotide polymorphisms (SNPs) have been shown to predict age of onset of malignancy in patients with high-risk mutations for breast cancer. The ability to predict risk of age of onset of disease in patients with Lynch Syndrome could potentially reduce the repeated risk exposure and inconvenience that comes with screening colonoscopy, potentially improving compliance with current screening regimes and targeting prophylactic surgery to individual patients where appropriate.

**Methods/Interventions:** *MLH1* and *MSH2* mutation carriers, patients with sporadic colorectal cancer but no genetic mutation and a control population were identified from the Manchester Genetics Database. A SNP panel of 16 SNPs previously identified in validation studies to be associated with colorectal cancer was developed. Lymphocyte DNA was sequenced and genotyped using Sequenom MassArray technology. Polygenic risk scores for each individual were stratified into quintiles. Cox proportional hazards model was used to assess the relationship between colorectal cancer and risk score. Polygenic risk scores (overall colorectal cancer risk scores (OCRS)) were calculated for each patient depending on the number of risk alleles and minor allele frequencies (MAF) described in published validation studies. Weighted risk scores were then calculated for each SNP, for the presence of zero, one or two risk alleles (wild type, heterozygous, homozygous respectively). Relative risks published in validation studies were utilised such that the weighting for each genotype when multiplied by the population frequencies of the genotypes equals 100. As such, the odds ratios were normalized around a population average risk of 1.0.

**Results/Outcome(s):** 943 patients were included in the analysis (162 *MLH1*, 207 *MSH2* mutation carriers, 251 sporadic colorectal cancer cases, and 323 controls). 67.1% *MLH1* and 47.8% of *MSH2* mutation carriers had developed colorectal cancer. Overall colorectal cancer risk score (OCRS) was higher in the sporadic group than any other group (*MLH1*  $p=0.02$ , *MSH2*  $p<0.001$ , Control  $p<0.001$ ). There was no association with increasing OCRS and earlier age of onset of disease in *MLH1*, *MSH2* or sporadic groups ( $p>0.05$ ).

**Conclusions/Discussion:** This study confirms that SNPs previously reported to be associated with colorectal cancer are more prevalent in patients with sporadic colorectal cancer than in high-risk mutation carriers or a control population. These SNPs do not appear to have current value in predicting age of onset of disease in any of the populations included in the study.

## ADEQUACY OF ETHICS EDUCATION IN COLON AND RECTAL SURGERY TRAINING PROGRAMS.

P9

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**Purpose/Background:** Are we really doing what we say we should be doing in Colon and Rectal Surgery training programs when it comes to ethics education? Nearly everyone would agree that ethics education is important but even if ethics education is a part of the training program then what is its quality? Ethics education is supported by the ACGME Program Requirements for Graduate Medical Education in Colon and Rectal Surgery and General Surgery but ethics is only mentioned 3 and 2 times respectively: 1) The physician faculty must maintain professional standards of clinical excellence and ethical behavior (only in Colon and Rectal Surgery), 2) Residents must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles, and 3) a high standard of ethical behavior. The American Board of Colon and Rectal Surgery states as a General Requirement that, "The moral and ethical fitness of a candidate must be satisfactory to the Board and in conformity with the Statements on Principles of the American College of Surgeons, and the Principles of Medical Ethics of the American Medical Association". The American Board of Surgery in its Booklet of Information states in its General Requirements that a candidate must "have an ethical, professional, and moral status acceptable to the ABS". A candidate can be tested on the certifying examination on "issues related to a candidate's ethical and humanistic qualities." It also includes an Ethics and Professional Policy that is updated yearly. Now back to the original questions. Are we really doing what we say we should be doing? And what is the quality of ethics education?

**Methods/Interventions:** An eight question survey to assess the presence and adequacy of ethics education in Colon and Rectal Surgery training programs was created and sent to the Program Directors to take themselves and to pass on to both Faculty Members and Residents (past and present).

**Results/Outcome(s):** Fifty-seven surveys were sent and there were 45 responses (33.3% Residents, 31.1% Faculty Members, 24.4% Program Directors, and 11.1% General Surgery Residents). Most of the ethics education in training programs came from informal discussion of a specific case (60%) and the rest came from either a CRS Conference dedicated to ethics education (35.6%), a CRS Conference not dedicated to ethics education (31.1%), a formal discussion of a specific case (28.9%), or an ethics conference (15.6%). As to its quality, 28.9% stated that the adequacy of the ethics education was "Extremely" or "Moderately" adequate, 31.1% stated that it was

“Adequate”, and 40.0% stated that it was “Marginally” adequate and “Not adequate at all”.

**Conclusions/Discussion:** There are areas for improvement in the ethics education of Colon and Rectal Surgery Residents based on this survey.

## LONGITUDINAL ANALYSIS OF URINARY METABOLIC PHENOTYPE AFTER COLORECTAL RESECTION DEMONSTRATE TEMPORAL EVOLUTION.

P10

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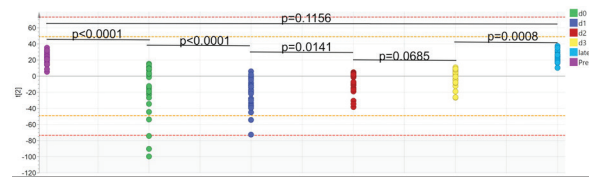
**Purpose/Background:** Current assessment of recovery and complication development following colorectal resection relies on the evaluation of non-specific downstream parameters including vital signs and inflammatory markers. Urinary metabolic phenotyping by mass spectrometry is a novel methodology that may provide more detailed quantification of a patient’s physiological status. The effects of colorectal surgery on urinary metabolic phenotype are unknown.

**Methods/Interventions:** Urine was collected at 6 time-points (pre-operative, days 0, 1, 2, 3 and late post-operative [day 20-30]) from a subset of patients undergoing laparoscopic or open colorectal resection for malignancy at seven UK centres as part of a separate clinical trial (EnROL study, Kennedy et al. 2014). Samples were analysed by reversed phase negative high-performance liquid-chromatography mass-spectrometry (HPLC-MS). Multivariate analysis was performed in SIMCA and R.

**Results/Outcome(s):** 164 urine samples were collected from 41 patients (27 male [66%]), of whom 20 (49%) underwent resection completed laparoscopically. Anatomies of the resections were: 27 (66%) colon, 13 (32%) rectum and 1 (2%) panproctocolectomy. Principal component analysis (PCA) demonstrated a time-dependent evolution in metabolic profile with significant perturbation from baseline at d0 and gradual recovery by the late post-operative time-point (figure 1). Paired comparisons of component scores between sequential time-points confirmed significant differences in metabolic profile between pre-operative and d0; d0 and d1; d1 and d2; and d3 and late post-operative samples (figure 1). No differences were noted between d2 and d3 or pre- and late post-operative samples. Sample acquisition was incomplete, leaving 14 patients with a complete set of samples at pre-operative, d0, d1 and d2/3 time-points. ANOVA-simultaneous component analysis (ASCA) of this cohort demonstrated a significant effect (by permutation testing,  $n=1000$ ) of time ( $p=0.002$ ) and surgical approach (laparoscopic [ $n=7$ ] vs. open,  $p=0.042$ ) but no significant interaction between the two ( $p=0.894$ ). High ( $n=5$ ) vs. low physiological component

of the POSSUM score, but not resection anatomy (e.g. colon [ $n=5$ ] vs. rectum), also had a significant effect on metabolic profile ( $p=0.005$ ).

**Conclusions/Discussion:** Colorectal resection causes significant perturbation in urinary metabolic profile that recovers to baseline over time. Furthermore, the metabolic response to surgery appears to be sensitive to the degree of surgical trauma and the baseline physiological status of the patient. In combination, these findings indicate that urinary metabolic profile may prove useful in monitoring recovery following colorectal resection where deviation from an established “normal” trajectory could herald the development of post-operative complications.



Scatter plot of patients’ component scores at each time-point. p values from paired comparison of component scores between consecutive time-points by Hotelling’s  $T^2$  tests.

## SURGICAL OUTCOMES IN LAPAROSCOPIC AND ROBOTIC COLORECTAL SURGERY: A SINGLE SURGEON EXPERIENCE.

P11

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**Purpose/Background:** As use of robotic-assisted surgery increases, measures of surgical outcomes and cost effectiveness must be assessed to validate its benefit in colorectal surgery. We compared outcomes of patients undergoing colorectal resection for benign and malignant disease, using either laparoscopic or robotic-assisted surgery performed by a single surgeon.

**Methods/Interventions:** Records of patients who underwent laparoscopic or robotic colorectal surgery between January 2012 and July 2016 were reviewed for this retrospective, case-control study. Perioperative outcomes and oncologic measures were compared using NSQIP data and chart review. Data points included operative time, surgical margin, estimated blood loss (EBL), length of stay, and number of lymph nodes retrieved. Statistical analyses included Chi-square, Fisher’s exact test, Student’s t-test, and Mann-Whitney rank tests. In addition, financial analysis was performed to determine cost effectiveness of specific robotic vs. laparoscopic procedures.

**Results/Outcome(s):** There were 132 robotic and 126 laparoscopic procedures. The only statistically significant difference in patient demographics was ASA score (median score of 3 for robotic cases, 2 for laparoscopic;  $p=0.002$ ). Urinary retention was the only post-operative

complication with a significant difference (5.3% for robotic cases compared to 2.4% laparoscopic,  $p=0.002$ ). There was no significant difference in anastomotic leaks, hematomas, EBL, conversion to open, or mortality. Proximal margin was greater in the robotic group (8.25 cm vs. 6.1 cm,  $p=0.006$ ). There was no difference in number of lymph nodes harvested (median 18, range 3-61 vs 18.5, 1-48,  $p=0.84$ ) or mean operative times ( $2.40\pm 0.98$  vs  $2.31\pm 0.99$  hours,  $p=0.47$ ). Subset analysis revealed a shorter operative time for robotic sigmoid colectomy ( $2.51\pm 0.68$  vs  $2.05\pm 0.62$  hours,  $p<0.009$ ) and shorter LOS (median 6, range 3-58 vs 4, 2-9  $p<0.004$ ), even after exclusion of ERAS patients. In review of a subset of cases (63 robotic and 121 laparoscopic) robotic surgery was associated with higher direct costs (67.8% more,  $p<0.001$ ) but lower indirect costs (8.12% lower,  $p=0.009$ ). The net revenue and income were higher for robotic cases (6.02% more,  $p=0.21$ , and 16.7% more,  $p=0.11$ , respectively), but the differences were not statistically significant.

**Conclusions/Discussion:** Our retrospective review demonstrates comparable baseline characteristics and similar outcomes regardless of which technique is used. Patients who underwent robotic sigmoidectomies had significantly shorter hospital length of stay and operative times. Robotic colectomies were associated with a higher direct cost and lower indirect cost. Although not statistically significant, robotic colectomies demonstrated a higher net revenue and net income.

### PREDICTORS OF ADEQUATE LYMPH NODE YIELD DURING COLECTOMIES FOR COLON CANCER.

P12

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**Purpose/Background:** Regional lymphadenectomy is a fundamental principle for adequate oncologic resection for colon cancer. Consensus guidelines recommend a minimum of 12 lymph nodes be assessed for accurate staging. Adequate lymph node (LN) resection is a prognostic indicator, associated with patient outcomes including survival, and guides the need for adjuvant chemotherapy. Factors affecting lymph node (LN) yield in colectomies have been studied, but research is limited to institutional experiences. Further, there is scarce data on the effect of surgical approach on LN yield. Using a multi-institutional, national database, the American College of Surgeons National Surgical Quality Improvement Program, ACS-NSQIP, we explore factors that influence LN yield in colectomies for colon cancer.

**Methods/Interventions:** Using the colectomy-targeted NSQIP database, we conducted a retrospective, cross-sectional analysis of all patients undergoing elective colectomy for colon cancer during 2014 and 2015, the first

years when LN data were collected. Our primary outcome was LN yield of at least 12 or not. We used multivariate logistic regression to determine how surgical approach (determined by CPT and ICD 9 and 10 codes) impacted LN yield, controlling for disease characteristics (location of cancer, T and N stage) and patient factors (age, gender, race, and several preoperative conditions). Likelihood ratio tests were used to determine statistical evidence for interaction between approach and location.

**Results/Outcome(s):** A total of 14,781 patients underwent colectomy (30% open, 25.8% laparoscopic, 27.5% hand assist, 8.3% robotic, and 0.3% SILS). 91% of patients had greater than 12 LN. Laparoscopic, hand-assist, and robotic approaches were more likely to have >12 LN than open surgery on logistic regression analysis (table 1). Adequate LN resection was less likely for left-sided (OR = 0.46, 0.40-0.53) and transverse tumors (OR = 0.53, 0.42-0.66) compared to right sided tumors. More right sided than left tumors were resected laparoscopically (65.3% vs 56.5%) but less robotically (5.14% vs. 11.87%,  $\chi^2<0.0001$ ). There was no statistical evidence for interaction between approach of surgery and location on LN yield. More advanced disease (T and N stage) was more likely to yield adequate LN resection. Preoperative factors such as steroid use, smoking, and neoadjuvant therapy were associated with decreased likelihood of adequate LN resection.

**Conclusions/Discussion:** This is one of the first multi-institutional studies to identify procedure, disease and patient related factors that influence adequate LN yield in colectomies for cancer. Minimally invasive approaches improve LN yield, as laparoscopic and robotic colectomies were 30 to 45% more likely to achieve adequate LN harvest compared to open surgery. Non-modifiable patient and disease related factors (cancer location, neoadjuvant chemotherapy, steroid use may render adequate LN yield challenging.

### SAFE SURGERY IN THE ELDERLY: A REVIEW OF OUTCOMES FOLLOWING ROBOTIC PROCTECTOMY FROM THE NATIONWIDE INPATIENT SAMPLE.

P13

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**Purpose/Background:** As our nation's population ages, operating on older and sicker patients occurs more frequently. Robotic operations have been thought to bridge the gap between a laparoscopic and an open approach, especially in more complex cases like proctectomy. We sought to evaluate the use and outcomes of robotic proctectomy compared to open and laparoscopic approaches for rectal cancer in the elderly.

**Methods/Interventions:** Retrospective review utilizing the Nationwide Inpatient Sample (NIS; 2006-2013). All cases were restricted to age 70 years old or greater. ICD-9-CM diagnosis and procedural coding was utilized to identify and compare outcomes of rectal cancer treated with an open, laparoscopic or robotic proctectomy. Abdominoperineal resections were excluded. Demographics, comorbidities, and postoperative outcomes were identified.

**Results/Outcome(s):** We identified 6,740 admissions for rectal cancer including: 5,879 open, 666 laparoscopic, and 195 robotic procedures. The median age was 77 years old and 54% of cases were men. The oldest patient was 101 years old, and 3% of patients were >90 years old. The mean

Elixhauser comorbidity index was significantly greater in the open vs. robotic cohort (6.7 vs. 5.2;  $p=0.02$ ), but not different when comparing robotics to laparoscopy. The rate of ileostomy creation was significantly greater for robotics (26%) compared to open (7.6%), and laparoscopy (8.6%) ( $p<0.01$ ); however, there was no difference in colostomy formation (**Table 1**). The overall mortality rate was low (2.1%) with no significant difference among the groups. Robotic proctectomy was associated with a decreased risk of gastrointestinal (GI) complications compared to open (1.5% vs. 9.8%;  $p<0.01$ ) and laparoscopic (1.5% vs. 7.8%;  $p<0.01$ ). These findings remained significant after adjusting for covariates, including age, Elixhauser comorbidity index, and a propensity score (OR=0.18;  $p<0.01$

P12

	n (%)	<12 Lymph nodes n (%)	≥ 12 Lymph nodes n (%)	Odds Ratio (95% CI)	P value
Total cases	14,781 (100)	1,315 (8.89)	13,466 (91.10)		
Open resection	4,443 (30.06)	477 (37.27)	3,966 (29.45)	Reference	
Laparoscopic resection	3,812 (25.79)	296 (22.51)	3,516 (26.11)	1.3 (1.11 - 1.53)	$p=0.002$
Laparoscopic with hand-assist	4,062 (27.48)	305 (23.19)	3,757 (27.9)	1.45 (1.23-1.70)	$p<0.0001$
Laparoscopic with conversion to open	1,128 (7.63)	103 (7.83)	1,025 (7.61)	1.20 (0.96-1.51)	$p=0.115$
Robotic	1,228 (8.31)	128 (9.73)	1,100 (7.61)	1.30 (1.05 - 1.62)	$p=0.018$
Robotic with conversion to open	64 (0.43)	1 (0.08)	63 (0.47)	10.5 (1.44-76.40)	$p=0.02$
SILS	44 (0.30)	5 (0.38)	39 (0.29)	0.89 (0.34-2.39)	$p=0.832$
Right colectomy	6,345 (42.93)	347 (26.39)	5,998 (44.54)	Reference	
Left colectomy	7,245 (49.02)	849 (65.56)	6,396 (47.5)	0.46 (0.40-0.53)	$p<0.0001$
Transverse colectomy	1,191 (8.06)	119 (9.05)	1,072 (7.96)	0.53 (0.42-0.66)	$p<0.0001$
Mean Age (SD)	47.89 (13.71)	48.7 (12.70)	47.81 (13.80)	0.98 (0.98-0.99)	$p<0.0001$
Male	7,305 (49.42)	610 (46.39)	6,695(49.72)	Reference	
Female	7,474 (50.58)	705 (53.61)	6,771 (50.28)	0.94 (0.83-1.05)	$p=0.291$
White	12,267 (82.99)	1,017 (84.18)	11,160 (82.88)	Reference	
Black	1,695 (11.47)	159 (12.09)	1,536 (11.41)	0.87 (0.72-1.04)	$p=0.126$
Asian	730 (4.94)	42 (3.19)	688 (5.11)	1.63 (1.18-2.25)	$p=0.003$
T0 stage	508 (3.44)	85 (6.46)	423 (3.14)	Reference	
T1 stage	1,589 (10.75)	220 (16.73)	1,369 (10.17)	0.89 (0.67-1.19)	$p=0.431$
T2 stage	2,479 (16.77)	232 (17.64)	2,247 (16.69)	1.864 (1.24-2.17)	$p=0.01$
T3 stage	7,631 (51.63)	562 (52.74)	7,069 (52.50)	2.07 (1.58-2.70)	$p<0.001$
T4 stage	2,574 (17.41)	216 (16.43)	2,358 (17.51)	1.70 (1.25-2.30)	$p=0.001$
N0 stage	8,465 (57.27)	801 (60.91)	7,664 (56.91)	Reference	
N1 stage	4,067 (27.52)	369 (28.06)	3,698 (27.46)	0.92 (0.80-1.10)	$p=0.232$
N2 stage	2,249 (15.22)	145 (11.03)	2,104 (15.62)	1.23 (1.01-1.50)	$p=0.047$
Preoperative Steroid use	469 (3.17)	58 (4.41)	411 (3.05)	0.68 (0.50-0.90)	$p=0.007$
Smoking history	2,006 (13.57)	205 (15.59)	1,801 (13.37)	0.82 (0.69-0.96)	$p=0.016$
Neoadjuvant therapy	1,723 (11.66)	298 (22.66)	1,425 (10.58)	0.45 (0.38-0.53)	$p<0.0001$
Preoperative >10% weight loss	935 (6.33)	58 (4.41)	877 (6.51)	1.58 (1.19-2.09)	$p=0.001$

for robotic vs. open, and OR=0.23; p=0.01, for robotic vs. laparoscopic). Median (interquartile range) length of stay (LOS) was shorter for robotics at 4.3 (3-7) days, compared to laparoscopic 5.8 (4-8) and open at 6.7 (5-10) days (p<0.01), while median total hospital charges were higher in the robotic group compared to laparoscopic and open cases (\$64,743 vs. \$55,813 vs. \$50,355, respectively, p<0.01).

**Conclusions/Discussion:** This investigation represents the largest analysis of robotic proctectomy for cancer in the elderly population. There has been a significant increase in the utilization of this robotic procedure in the United States over the studied 5-year period (2009-2013). In addition to a reduction in postoperative GI complications, robotic proctectomy was associated with a shorter LOS, and this may act as a surrogate marker for an overall improvement in adverse events. These results demonstrate that a robotic approach is a safe and feasible option, and should not be discounted solely based on age or comorbidities.

Table 1. Procedural Demographics

Variable (2006-2013)	Open (n = 5879) n (%weighted)	Laparoscopic (n=666) n (%weighted)	Robotic (n=195) n (%weighted)	Open vs. Robotic (p)	Laparoscopic vs. Robotic (p)
Median (IQR) Age	77 (72-82)	77 (72-81)	75 (72-80)	<0.01	<0.01
Elixhauser Comorbidity Index [mean (95% CI)]	6.7 (6.5-6.9)	5.9 (5.4-6.5)	5.2 (4.2-6.2)	0.02	0.30
Gender					
Male	3139 (53)	390 (59)	105 (54)	0.92	0.25
Race/ethnicity					
Caucasian	4061 (69)	460 (69)	133 (68)		
African American	275 (5)	30 (4)	9 (5)		
Hispanic	319 (5)	53 (8)	17 (9)	0.02	0.84
Other	307 (5)	48 (7)	18 (9)		
Unknown	917 (16)	75 (11)	18 (9)		
Medicare Insurance	5414 (92)	173 (89)	596 (90)	0.09	0.68
Location/teaching status					
Rural	634 (11)	42 (6)	2 (1)		
Urban non-teaching	2536 (43)	285 (43)	57 (30)	<0.01	<0.01
Urban teaching	2697 (46)	334 (51)	134 (69)		
Disease stage					
Localized (Stage I)	2788 (68)	278 (71)	30 (89)		
Locally advanced (Stage II)	155 (4)	17 (4)	0 (0)	0.06	0.15
Node positive (Stage III)	644 (16)	53 (13)	3 (9)		
Metastatic (Stage IV)	517 (13)	44 (11)	1 (3)		
Ostomy (Total)	1619 (28)	154 (23)	79 (41)	<0.01	<0.01
Colectomy	1193 (20)	98 (15)	32 (16)	0.17	0.68
Ileostomy	429 (7.6)	57 (8.6)	49 (26)	<0.01	<0.01

IQR = Interquartile Range  
CI = confidence interval

**UTILITY OF THE VERTICAL RECTUS ABDOMINIS MYOCUTANEOUS FLAP FOR ABDOMINOPERINEAL RESECTION AND PELVIC EXENTERATION DEFECTS.**

P14

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**Purpose/Background:** Perineal wound morbidity after abdominoperineal resection (APR) or pelvic exenteration is not an infrequent postoperative challenge. The purpose of this study is to describe our experience with routine use of vertical rectus abdominis myocutaneous (VRAM) flap reconstruction for the closure of the perineal defect after these procedures.

**Methods/Interventions:** Retrospective review of all patients with locally advanced rectal or anal cancer treated with APR or pelvic exenteration at a university hospital between 2004 and 2014. Wound outcomes were then evaluated. The primary outcome of interest was major perineal

wound complication (flap failure or partial flap loss). The secondary outcome of interest was overall wound complications (flap failure, partial flap loss, perineal wound separation, perineal wound infection, chronic drainage, as well as donor site complications to include hernias).

**Results/Outcome(s):** 42 patients met inclusion criteria during the study period. Mean follow up was 13 months. Mean age was 56 years, mean albumin was 3.6 g/dL, mean BMI was 26. Forty three percent of patients were male, and 26% had a vascular comorbidity (diabetes, active smoking, coronary or peripheral arterial disease). Nearly all (93%) had received neoadjuvant pelvic radiation and chemotherapy (88%). Major perineal wound complications occurred in 4 patients (10%). Overall wound complication rates were 57%, with a hernia rate of 2.3%. Within our population, none of the aforementioned variables were independently associated with rates of wound complications on multivariable analysis controlling for preoperative radiation.

**Conclusions/Discussion:** Perineal wounds after APR or pelvic exenteration are high risk, especially after radiation therapy. We have shown a relatively low rate of major perineal wound complications within this population when routinely using VRAM reconstruction. Ultimately a large, randomized study is needed to truly define the ideal perineal closure technique.

**THE MASIC (MOTHERS WITH ANAL SPHINCTER INJURIES IN CHILDBIRTH) FOUNDATION, AN AFTERMATH OF A WORD PICTURE TO DESCRIBE THE OASIS SYNDROME.**

P15

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**Purpose/Background:** We recently described a word picture which identified a recognisable syndrome of the emotional, social and psychological consequences of anal incontinence as a result of Obstetric Anal Sphincter Injuries: OASIS (Keighley et al 2016). This qualitative approach used case studies (n=81), interviews (n=14) and a focus group (n=14) and identified repetitive themes with reference to the emotional, social and psychological consequences of anal incontinence after childbirth which was displayed as a 'word picture'. As a result of recognising the emotional morbidity amongst these mothers a support group was established with charitable status to overcome their isolation and dignity loss.

**Methods/Interventions:** Following two focus groups amongst mothers with OASIS and health professionals, we established a Foundation aimed to deliver the following: improved awareness of the consequences of OASIS within the medical profession, greater awareness of childbirth related trauma by the public, advice for mothers with

bowel incontinence after childbirth, research into the best access to a care pathway for support and methods of preventing injuries and their consequences.

**Results/Outcome(s):** Two focus groups have confirmed that women with anal incontinence following childbirth feel unclean which results in dignity loss, psychosexual morbidity, isolation, embarrassment, guilt, fear, depression, anxiety, loss of confidence, a feeling of having been mutilated and compromised motherhood. This unspoken taboo is hidden from the family and is withheld from the profession. Coping relies on repetitive washing, having to plan daily activities, family support and attention to the child whose birth resulted in the injury. Recovery and healing is best achieved by care of the child, medical advice and sharing. As a result of these interventions we have established a Charitable Foundation, hosted a national education day, stimulated a national television focus on the “hidden trauma of childbirth” and set up a website which provides a helpline for mothers with anal incontinence after childbirth.

**Conclusions/Discussion:** Improved awareness within the profession and the public has helped to overcome the stigma of the unspoken taboo of anal incontinence after childbirth.

#### FLUORESCENCE-GUIDED SURGERY IN COLORECTAL ANASTOMOSIS: PROSPECTIVE STUDY OF CLINICAL OUTCOMES AND OBJECTIVE QUANTIFICATION OF THE INDOCYANINE GREEN SIGNAL THROUGH THE USE OF AN EUROPEAN SYSTEM.

P16

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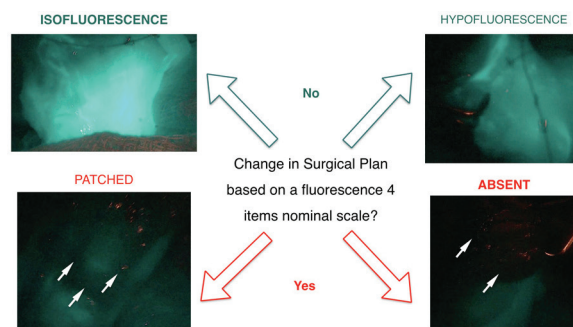
**Purpose/Background:** Analyze the clinical impact of fluorescence-guided surgery in colorectal anastomosis and conduct a study of diagnostic accuracy to quantify objectively the findings visualized by fluorescence.

**Methods/Interventions:** Prospective study involving 30 non-selected patients in which a colo-colonic or colorectal anastomosis was performed in a colorectal surgery unit. Technique involves injecting the indocyanine green (0.4 mg/Kg) at the time of preparing the proximal anastomotic margin and evaluate their fluorescence 3 min after injection based on a nominal visual scale (Figure 1). Surgical plan change intraoperatively increasing resection if fluorescence is absent or patched. Anastomotic leak related variables (preoperatively, intraoperatively and postoperatively up to 1 month) and the use of indocyanine green were analyzed. We have also studied the correlation between intraoperative findings, obtained using a visual nominal

scale front, the percentage value of indocyanine green analyzed postoperatively through captured images during the surgical procedure.

**Results/Outcome(s):** Most frequent indication was colorectal cancer in 21 (70%) cases. Most of the patients (80%) had associated medical pathologies and 7 (23%) cases received neoadjuvancy. Operative time was 145 (140) min. Splenic-flexure mobilization was performed in 5 (18%) cases, high ligation of the inferior mesenteric artery in 21 (70%) patients and 63% of the anastomosis was localized above 10 cm from the anal margin. The maximum fluorescence is attained within 60 sec on average. Fluorescence guided-surgery changed surgical plan in 1 (3%) patient. There was a case of self-limiting respiratory adverse effect associated with the infusion of indocyanine green. Postoperative morbidity consisted in 8 (26%) minor medical complications and 3 (10%) minor surgical complications (Clavien-Dindo I/II). There has been no case of anastomotic fistula with clinical impact or need for reoperation or invasive procedures (Clavien-Dindo III). In the only case in which the surgical attitude changed based on fluorescence, no leaks occurred. There were no complications related to indocyanine green in renal and hepatic laboratory studies. The concordance study showed satisfactory results ( $\kappa=0.47$ ) between intraoperative indocyanine green qualitative assessment (nominal visual scale) and postoperative indocyanine green quantitative assessment.

**Conclusions/Discussion:** Fluorescence guided-surgery is a safe and reproducibly tool with minimal added complexity that could have an impact on surgical strategy and clinical results in colorectal anastomosis. Our initial results show that the visual scale used intraoperatively for this purpose moderately correlated with quantitative fluorescence data postoperatively obtained through a specialized computer analysis.



### OUTCOMES IMPROVEMENTS WITH INTERDEPARTMENTAL CONSENSUS AND DEVELOPMENT OF AN ERAS-BUNDLED ORDER SET.

P17

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**Purpose/Background:** Enhanced recovery programs have already been highly successful and widely accepted in Europe, and they continue to grow in popularity in the United States. ERAS programs (formerly known as Fast-Track Programs) have been shown to significantly improve surgical outcomes including surgical complications, morbidity, length of stay, and without an increase in readmission rates. This is accomplished through multimodal pain control (and minimal opioid analgesia), early enteral nutrition, the utilization of minimally invasive surgery, and other means. Despite the significant body of evidence indicating that ERAS protocols lead to improved outcomes, they challenge traditional surgical doctrine. As a result, their implementation in the U.S. has been slow.

**Methods/Interventions:** An ERAS pathway was developed at a tertiary referral center with the goals of decreasing patient length of stay as well as hospital-related morbidity. The program consisted of developing interdepartmental consensus with numerous perioperative interventions. This program was a continuation of a previously successful multidisciplinary colorectal bundle ordered set and change in culture developed to address high surgical site infection rates. After IRB approval, data was prospectively gathered on all participating patients (n=46) including demographic information, diagnosis, comorbidities, operation, length of stay, time to flatus, readmission, complications, etc.. A control group (n=59) comprised of elective cases from the time period between 1/1/2015 to 12/31/2015 prior to the implementation of the ERAS order pathways was used for comparison. These data were compared using students t-tests for length of stay and other data was gathered as quality improvement metrics.

**Results/Outcome(s):** Median length of stay decreased significantly ( $p < 0.0001$ ) from 5 days in the year preceding implementation to 2 (range 1 - 5) days after program implementation. Total and total direct cost per case decreased from \$19,949 to \$13,569 and \$13,647 to \$9,831 after program implementation. Press-Ganey and HCAHPS data showed improvements in patient satisfaction metrics with hospital ratings of 9 or 10 now at 92% and likelihood to recommend at 98th percentile. Twenty-nine percent of patients required absolutely no narcotics in the course of their admission (OR, PACU, or postoperatively), while 29% used only 1-10 morphine equivalents (ME), 27% used 11-50 ME, and 18% used from 50-250 ME. Readmission rates after the implementation of our specific ERAS protocol remained stable at approximately 15%.

**Conclusions/Discussion:** The implementation of our ERAS program resulted in a significant decrease in patient length of stay. Narcotic use was low for most patients with many patients requiring few if any narcotic medications during their entire stay. Costs of patient care per procedure were also decreased, with concomitant increases in patient satisfaction scores.

### FEELING RUSHED? DOES LATE START TIME PREDICT POOR QUALITY COLONOSCOPY?

P18

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**Purpose/Background:** Missed adenomas during screening colonoscopy may lead to interval colon cancer, and quality indicators for colonoscopy have been developed to reduce the incidence of interval colon cancer. Adenoma detection rate (ADR) is associated with risk of interval colon cancer and has been established as a key quality indicator for colonoscopy. Other important quality indicators include withdrawal time from the cecum  $\geq 6$  minutes and frequency of cecal intubation. We hypothesized that a delayed procedure start time may cause the endoscopist to feel rushed thereby reducing the withdrawal time or ADR. We sought to examine whether a delayed procedure start or other timing factors impacts these quality indicators for colonoscopy.

**Methods/Interventions:** We retrospectively reviewed charts for all patients undergoing screening colonoscopies by all eight endoscopists in our ambulatory surgery center from January – February 2016. Data gathered included patient demographics, day of procedure, scheduled start, actual start, cecal intubation, and completion times, number of polypectomies, and pathology results. ADR was defined as proportion of subjects in whom at least one adenomatous lesion or sessile serrated polyp was identified. Late start time was defined as an actual vs. scheduled procedure start time  $\geq 15$  minutes. Multiple logistic regression was used to determine association between late start time or other timing factors and quality indicators of colonoscopy.

**Results/Outcome(s):** A total of 691 patients were analyzed: 344 males (49.7%) and 348 females (50.3%) with a median age of 60 years old. The mean withdrawal time was 10.6 minutes with 99.0% rate of  $\geq 6$  minutes. There was no difference in mean (SD) withdrawal time between late start cases and on time cases [10.5 (4.9) vs. 10.6 (6.1) min,  $p = 0.8956$ ]. The overall cecal intubation rate was 98.6%. There was no difference in cecal intubation rate between late start and on time cases (98.7% vs 98.4%,  $p = 0.7609$ ). ADR was associated with sex [male (49.2%) vs. female (30.2%),  $p < 0.0001$ ], age [mean(SD) 57.7 (12.5) for no adenoma vs 62.6 (10.3) for adenoma detected,  $p < 0.0001$ ], and endoscopist (range 24%-60%,  $p < 0.0001$ ). Mean (SD)



difference between actual and scheduled start time did not differ between cases with adenoma [11.5 (25.7) min] and those without [13.9 (32.4) min] ( $p=0.2541$ ), and there was no difference in ADR between late start time and on-time cases (37.5% vs 41.7%,  $p=0.275$ ). Analyses which accounted for age, sex, and individual endoscopist found no association between ADR and late start time ( $p=0.2701$ ), case load for the day ( $p=0.8384$ ), time of day ( $p=0.9345$ ), or day of the week ( $p=0.5985$ ).

**Conclusions/Discussion:** We found that quality of colonoscopy was not impacted by delayed start time in terms of adenoma detection rate or withdrawal time. As shown in other studies, ADR varies greatly by endoscopist. Further research should elucidate the reasons behind this in order to further improve quality of colonoscopy.

Table 1. Adenoma Detection Rate by Attending, Withdrawal Time, Sex, and On Time vs. Late Start

Attending	On Time			Late			Total		
	Withdrawal Time Mean (SD)	ADR - Male %/N (%)	ADR - Female %/N (%)	Withdrawal Time Mean (SD)	ADR - Male %/N (%)	ADR - Female %/N (%)	Withdrawal Time Mean (SD)	ADR - Male %/N (%)	ADR - Female %/N (%)
A	18.1 (14.4)	3/7 (43%)	4/13 (31%)	14.9 (6.5)	<5 pts	1/6 (17%)	17.2 (12.6)	5/9 (56%)	5/19 (26%)
B	7.6 (2.7)	9/15 (60%)	4/19 (21%)	7.3 (2.1)	19/46 (41%)	3/26 (15%)	7.4 (2.3)	28/61 (46%)	8/45 (18%)
C	10.9 (3.1)	14/26 (54%)	7/19 (37%)	11.4 (4.0)	20/39 (51%)	11/40 (28%)	11.2 (3.7)	34/65 (52%)	18/59 (31%)
D	12.3 (2.9)	<5 pts	<5 pts	10.3 (5.4)	10/26 (38%)	5/24 (21%)	11.0 (5.3)	11/27 (41%)	5/27 (19%)
E	6.7 (1.3)	6/14 (43%)	5/24 (21%)	6.6 (1.1)	<5 pts	<5 pts	6.7 (1.2)	6/17 (35%)	5/29 (17%)
F	8.6 (1.9)	11/31 (35%)	11/38 (29%)	7.2 (0.6)	<5 pts	<5 pts	8.3 (1.9)	11/36 (31%)	14/50 (28%)
G	14.7 (6.5)	30/44 (68%)	25/52 (48%)	14.9 (4.8)	21/33 (64%)	15/23 (65%)	14.8 (5.3)	51/77 (66%)	40/75 (53%)
H	8.1 (2.6)	20/42 (48%)	9/21 (43%)	8.0 (4.1)	5/13 (38%)	3/9 (33%)	8.1 (3.0)	25/55 (45%)	9/40 (22%)
TOTAL	10.6 (6.1)	94/180 (52%)	64/199 (32%)	10.5 (4.9)	77/167 (46%)	40/145 (28%)	10.6 (5.6)	171/347 (49%)	104/344 (30%)

## REDUCED PORT LAPAROSCOPIC COLECTOMY VERSUS SINGLE PORT LAPAROSCOPIC COLECTOMY FOR COLON CANCER: SHORT-TERM OUTCOMES OF CASE-CONTROL STUDY.

P19

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**Purpose/Background:** There was only limited data in the literature comparing reduced port laparoscopic colectomy (RPLC) and single port laparoscopic colectomy (SPLC) for colon cancer. The aim of this study was to show the short-term outcomes and cosmetic results comparing RPLC with SPLC.

**Methods/Interventions:** This case-control study assessed 119 patients who underwent colon cancer surgery using RPLC (n=66) and SPLC (n=53) between March 2010 and December 2014. Propensity score matching resulted in 42 pairs of patients, equivalent in distribution of TNM stage and tumor size.

**Results/Outcome(s):** Perioperative outcomes and post-operative complications were similar in the two groups, except for tendency toward lower blood loss in RPLC group (50 mL vs 100 mL,  $p=0.087$ ). Umbilical incision sites were significantly more common in RPLC than SPLC for patients with left sided colon cancer (94.4% vs 66.7%,  $p=0.032$ ). In a subgroup with stage II to IV tumors, there were no significant between-group differences in perioperative outcomes.

**Conclusions/Discussion:** The short-term outcomes of RPLC were not superior to those of SPLC in patients with colon cancer. However, RPLC seemed to be associated

with better cosmetic results, due to its greater use of an umbilical approach in patients with left sided colon cancer. Larger prospective studies are required to clarify the relative benefits of RPLC over SPLC in colon cancer surgery.

## YOUR TURN IN THE HOT SEAT: RESULTS FROM THE FIRST FORMAL ASCRS MOCK ORAL EXAMINATION.

P20

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**Purpose/Background:** To achieve certification by the American Board of Colon and Rectal Surgery, candidates must pass an oral/certifying exam (CE). The CE is given to evaluate problem-solving ability, judgment, and knowledge of colorectal literature. Studies in other fields have shown that mock oral examinations (MOE) can improve examinee confidence and preparedness when taking their CEs. However, no published studies have evaluated the utility of a MOE in colorectal surgery. This study sought to assess the utility of a formal MOE for colorectal surgery and determine whether participation would increase participants' confidence in passing the CE.

**Methods/Interventions:** A formal MOE was designed by the Young Surgeons Committee (YSC) for the 2016 American Society of Colon and Rectal Surgeons annual meeting. Thirty YSC members served as examiners for 38 board eligible colorectal fellows and recent colorectal surgery graduates. Examinees participated in three 45-minute sessions (30 minutes of oral examinations, 15 minutes of feedback and questions). Each examinee completed at least 3 scenarios in the MOE. Examinees were given an 8 question pre and post MOE survey to assess their sense of preparedness, anticipated performance during the exam, and degree of confidence in passing the CE before and after MOE. Responses were rated on a 4-point Likert scale from "Strongly disagree" to "Strongly agree." Examinees also received a 20-question email survey after the MOE to further assess effectiveness of the MOE, and obtain feedback to improve future MOE sessions.

**Results/Outcome(s):** Twenty-five examinees responded to the pre and post MOE survey (66%), and surveys were paired for comparison. Before the MOE, 48% felt they could pass the CE, whereas after the exam 70% felt they could pass ( $\chi^2=9.22$ ,  $p<.002$ ). When asked whether they felt that they could "demonstrate appropriate surgical judgment, clinical reasoning skills, and problem solving ability," examinees were slightly less likely to agree with this statement post-MOE ( $t=2.14$ ,  $p<.043$ ). No significant difference was noted in any other survey questions. For the feedback survey, 97% of responders felt they were now more aware of the areas in which they needed to improve, 93% felt their confidence increased after the MOE, 55% felt the MOE exceeded their expectations, 90% said

the MOE will cause them to study more, 100% would recommend the MOE to future examinees, and 100% felt it should be offered at the annual meeting. Fifty percent (14/28) of participants stated the MOE was the major reason they attended the 2016 ASCRS meeting.

**Conclusions/Discussion:** Participation in the MOE had multiple benefits. It allowed candidates to identify areas for personal improvement and increased their confidence and comfort level. The program was regarded by participants as a valuable component of surgical education. Future study will focus on whether participation and increased confidence translates to higher pass rates on the CE.

### IMPLEMENTING ENTRUSTABLE PROFESSIONAL ACTIVITIES: BEGINNING THE YELLOW BRICK ROAD TOWARD COMPETENCY BASED TRAINING.

P21

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**Purpose/Background:** We describe our experience implementing competency based postgraduate surgical training using an entrustable professional activities (EPAs) curriculum. The curriculum was developed to meet the requirements of patient care, trainees, supervisors, hospital administration, and postgraduate surgical training organizations in Australia. It aims to improve patient outcomes by optimizing supervision of surgical trainees, and creating additional opportunities for teaching and feedback. The curriculum utilizes EPAs as a means of assessing competence. EPAs are key units of professional work that can be entrusted to a trainee once sufficient competence has been achieved. EPAs allow for monitored transition from supervised to autonomous practice.

**Methods/Interventions:** The curriculum was designed for implementation in a colorectal surgery department. The teaching faculty comprises eight consultants in colorectal surgery. The department supervises ten 'trainees' every year: four fellows, two registrars and four resident medical officers. We identified suitable EPAs using criteria described by ten Cate, with additional criteria emphasizing

patient safety and a focus on learning outcomes in colorectal surgery. Seven EPAs were selected for each type of trainee by consensus between two consultants in the teaching faculty. The selected EPAs, and levels of supervision for each EPA, were described using criteria outlined by ten Cate. The descriptions act as a guide to supervisors and trainees. Each EPA is assessed by a consultant or delegate at least once per term. The trainee is assigned a supervision level and given formal feedback at this time.

**Results/Outcome(s):** The curriculum was implemented with minimal disruption to key stakeholders. We continue to record trainee assessment data anticipating that performance of trainees on other tasks in the future may provide some evidence of validity for the EPA assessments.

**Conclusions/Discussion:** There are perceived benefits and problems evident with the EPA model at this early stage of implementation. There was increased formative assessment and feedback opportunities for trainees. As a component of deliberate practice and attaining expertise, feedback will likely facilitate improvement. Supervisors are familiar with the assessment process which facilitated implementation with minimal disruption to the activity of the department. There is concern, however, that supervisors may require further training to ensure that the assessment process is objective and reproducible. While the EPA curriculum has certainly made the process of delegating patient care to trainees more transparent, we have not identified a method of widely disseminating trainee assessment data without the potential to unfairly prejudice the trainee. Overall, the EPA curriculum appears to be fit for purpose and we continue to record assessment data for future analysis of its effect on training outcomes.

#### P21 Criteria used to identify EPAs

- 
1. Essential professional task commonly required in the colorectal department
  2. Requires knowledge, skill, and attitude
  3. Leads to output of professional labor
  4. Independently executable
  5. Achievable during the term according to the experience of the trainee
  6. Observable and measurable within an process and outcome
  7. Reflects one or more of the Royal Australian College of Surgeons competencies
  8. Important for safe patient care in the colorectal surgery unit
  9. Acceptable to the consultant faculty
-

## INSURANCE DISPARITIES AND LATE STAGE DIAGNOSIS IN COLON, RECTAL, AND ANAL CANCER.

P22

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L. Grimm  
Mobile, AL

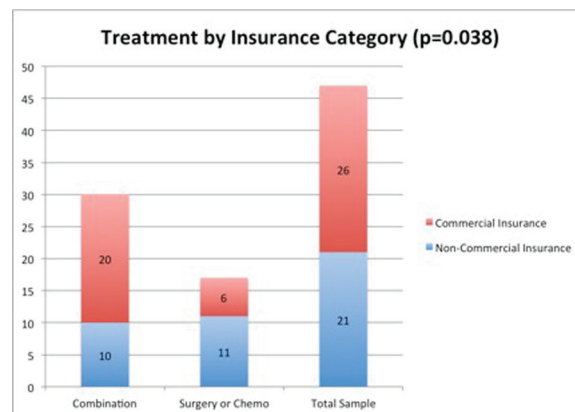
**Purpose/Background:** Socioeconomic and insurance disparities have been debated amongst patients presenting with advanced stage cancer. The aim of this study is to determine if patients with colon, rectal or anal cancer are diagnosed at a later stage based upon their socioeconomic, racial, or insurance status.

**Methods/Interventions:** An IRB approved retrospective chart review was performed for patients with newly diagnosed colon, rectal, or anal cancer from 2015 to 2016. The data was analyzed from our institutional multidisciplinary tumor board (MDT) database. Classification was based on insurance status at time of diagnosis. TNM staging was described using the national comprehensive cancer network. This was then separated into low and high stage, where “low stage” was defined as stage I or IIa for colorectal cancer and stage I or II for anal cancer. “High stage” was defined as > stage IIIb with colorectal cancer and > stage IIIa for anal cancer.

**Results/Outcome(s):** Of the 100 patients discussed at MDT, 95 total patients were included in the study based on identification of adenocarcinoma of the colon or rectum, or anal squamous cell carcinoma. We categorized the patients into Commercial and Non-commercial insurance. There was no significant association between age, gender, or stage at diagnosis based on insurance coverage using Chi-Square ( $\chi^2$ ) testing. However, 73% of patients with Non-Commercial insurance presented with a higher stage versus 54% for Commercial insurance. There was a significant difference in insurance category by race, with more non-white patients using Non-Commercial insurance ( $p=0.011$ ).  $\chi^2$  test for differences in treatment between insurance categories showed Non-Commercial patients were more likely to receive single therapy treatment of either chemotherapy or surgery, compared to Commercial patients, who were more likely to receive a combination of chemotherapy and surgery ( $p=0.038$ ). Additionally, Non-Commercial patients were less likely to receive surgery as a treatment compared to Commercial patients ( $p=0.009$ ).

**Conclusions/Discussion:** Healthcare disparities is highly publicized due to the economic and health burden placed on patients. Although our study was limited in power, 75% of self-pay and 100% of patients with only Medicaid presented with advanced stage cancer. Non-Commercial patients, who were more likely to be non-white, were more likely to receive single agent modality treatment, and that that treatment was less likely to be surgery, an inference may be related to presenting

with more advanced stage cancer, which surgery alone is an uncommon treatment pathway. Therefore, our study supports that Non-commercially insured patients may present with more advanced cancer of the colon, rectum, or anus. This finding may be attributed to a lack of access to health care and effective colorectal cancer screening modalities, not only in patients that are uninsured but also underinsured, such as patients with Medicaid or even Medicare.



## SCRIPTED PREOPERATIVE PATIENT EDUCATION MODULE REDUCES LENGTH OF STAY AND SURGICAL COMPLICATIONS, EVEN WHEN ADDED TO AN EXISTING ENHANCED RECOVERY AFTER SURGERY PATHWAY.

P23

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**Purpose/Background:** ERAS bundles have been shown to decrease LOS and complications following colorectal surgery, but the significance of individual factors within such bundles have not been well elucidated. Our goal was to determine whether a scripted educational telephone call by a Colorectal Surgery nurse practitioner and educational pamphlet designed to educate patients on preparing for upcoming surgery and on setting patient expectations regarding the importance of postoperative mobilization, narcotics avoidance, discharge criteria and discharge planning arrangements, provided a recovery benefit when added to a pre-existing ERAS bundle.

**Methods/Interventions:** We analyzed patient data from all colectomies performed at our institution since initiation of an ERAS protocol in September 2014 in the prospectively maintained NSQIP database. Mortality and length of stay >30 days were excluded to prevent bias from patients that had prolonged LOS or significant morbidity/mortality due to underlying severity of disease or technical error. Patients who received preoperative education by a nurse practitioner via a scripted telephone call and educational

pamphlet were compared to ERAS patients who did not receive educational materials. We then evaluated for differences in length of stay and surgical complications in these cohorts.

**Results/Outcome(s):** Of 1241 patients undergoing colectomy Sept 2014-Oct 2016, 505 (41%) were performed by surgeons who agreed to adhere to a defined perioperative ERAS protocol. ERAS Patients receiving pre-operative education were similar in baseline comorbidities to standard ERAS patient when performing univariate analysis with Bonferroni correction for multiple comparisons (Figure 1). Patients within an ERAS pathway had an overall decrease in LOS by four days ( $p < 0.001$ ), with a significant decrease in 30 day readmissions compared with non-ERAS patients (7% vs 11%,  $p < 0.05$ ). Among those patients on the ERAS pathway, 190 patients (38%) underwent a preoperative education module administered via a preoperative phone call and a subsequently mailed brochure summarizing the main teaching points. Patients receiving educational material had a significant decrease in their mean length of stay when compared to standard ERAS patients (3.0 days vs 3.7 days,  $P = 0.005$ ) with a trend toward improvement in rates of a composite of postoperative complications (8.4% vs 11.4%,  $p = 0.28$ ), including a 50% reduction in SSI rates (3.2% vs 6.0%,  $p = 0.15$ ).

**Conclusions/Discussion:** Scripted patient education modules may shorten length of stay and postoperative complications, even when added to an already existing ERAS bundle, which may translate into significant hospital cost savings.

**RACIAL DISPARITIES AFTER OSTOMY CONSTRUCTION IN COLORECTAL SURGERY.**

P24

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**Purpose/Background:** Racial disparities and poor access to care have been shown to be common among African American patients and adversely affect colorectal cancer detection and outcomes in Crohn’s disease. This is the first study to examine the effect of race on outcomes in patients undergoing ostomy construction in colorectal surgery. Using a large nationwide surgical database, we sought to determine the impact of race on outcomes for operations requiring stoma creation in malignancy, inflammatory bowel disease, and diverticular disease. Using bivariate and multivariable analysis, we sought to determine which disease cohorts had worse surgical outcomes in African American patients.

**Methods/Interventions:** The American College of Surgeons NSQIP database from 2013-2015 was used. Colorectal surgery cases involving colon, rectum, and small bowel resulting in stoma creation were selected. Postoperative diagnoses included malignancy, inflammatory bowel disease, and diverticular disease. After stratifying by race, unadjusted bivariate and adjusted multivariable analysis models were established. Primary outcomes of interest were overall complications, mortality, and hospital length of stay.

**Results/Outcome(s):** A total of 42,576 admissions were analyzed. African American patients constituted 9% of the overall cohort. African American and Caucasian patients were similar in age, gender, steroid dependence, functional status, ASA class, and rate of emergency cases ( $p > 0.05$ ). On bivariate analysis, African American patients with inflammatory bowel disease had the highest risk of complications compared to Caucasian patients (RR = 1.19; 95% CI, 1.11 – 1.27) and the highest risk of extended hospital length of stay (RR = 1.33; 95% CI, 1.20 – 1.47). After multivariable analysis, African American patients with inflammatory bowel disease still had the highest risk of complications compared to Caucasian patients (RR = 1.10; 95% CI, 1.03 – 1.18) and the highest risk of extended hospital length of stay (RR = 1.20; 95% CI, 1.14 – 1.28). On bivariate analysis, there was not a significant difference in mortality rates between African American and Caucasian patients.

**Conclusions/Discussion:** African American patients who undergo colorectal surgery requiring an ostomy experience a significantly higher rate of postoperative complications and greater hospital length of stay, even after comorbidity adjustment. This finding was highest in African American patients with inflammatory bowel disease. Preoperative access to care, socioeconomic and cultural factors, and comorbid disease management are

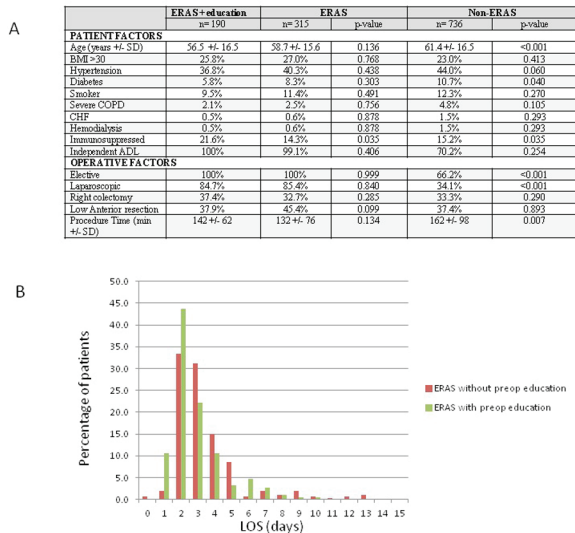


Figure 1. A) Comparison of baseline patient and operative factors between groups. ERAS with preoperative education group is used as baseline for statistical analyses. B) Histogram of length of stay (LOS) in days for all ERAS colectomy patients, with or without pre-operative education, expressed in percentage of patients discharged on a hospital day

all important factors in racial disparities in patients with inflammatory bowel disease who undergo colorectal surgery requiring ostomy construction.

**Complications**

	Bivariate			Multivariable		
	Risk Ratio	95% CI	p - value	Risk Ratio	95% CI	p - value
All Operations	1.06	1.03-1.08	<0.001	1.03	1.01-1.05	0.02
Inflammatory Bowel Disease	1.19	1.11-1.27	<0.001	1.10	1.03-1.18	0.005
Diverticular Disease	1.07	1.01-1.12	0.02	1.04	0.99-1.09	0.14
Malignancy	1.03	0.98-1.08	0.19	---	---	---
Other	1.03	1.00-1.07	0.08	---	---	---

**Extended Hospital Length of Stay**

	Bivariate			Multivariable		
	Risk Ratio	95% CI	p - value	Risk Ratio	95% CI	p - value
All Operations	1.21	1.17 - 1.25	<0.001	1.16	1.13 - 1.20	<0.001
Inflammatory Bowel Disease	1.23	1.17 - 1.30	<0.001	1.20	1.14 - 1.28	<0.001
Diverticular Disease	1.32	1.20 - 1.47	<0.001	1.11	1.00 - 1.23	0.04
Malignancy	1.23	1.17 - 1.30	<0.001	1.19	1.14-1.23	<0.001
Other	1.11	1.06 - 1.17	<0.001	1.09	1.04 - 1.15	<0.001

Table 1. Outcomes Data

**PREVENT TRIGGER SCALE FOR POSTOPERATIVE PROPHYLLAXIS OF SURGICAL SITE INFECTIONS IN PATIENTS WITH DIVERTICULITIS.**

P25

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**Purpose/Background:** SSIs cause significant morbidity and mortality following colorectal surgery. Some SSI prevention bundles have attempted to decrease risk of SSIs by modifying patient and disease specific risk factors. However, there are many risk factors that are not modifiable. Our goal was to create and validate a diverticulitis specific prediction scale that included both modifiable and non-modifiable variables, so as to better predict SSIs and help guide prophylactic postoperative care.

**Methods/Interventions:** We merged prospective NSQIP and RPDR data on patients undergoing surgery for diverticulitis in a Collaborative of 5 hospitals (community: 3, academic: 2) and retrospectively reviewed each chart for accuracy. We compared patients who did and did not have SSIs, combining superficial, deep and organ space. We then identified predictive variables using a logistic

regression model and obtained model estimates through 1000 bootstrap replications to validate a robust scale that is able to predict the patients at highest risk of developing postoperative SSI

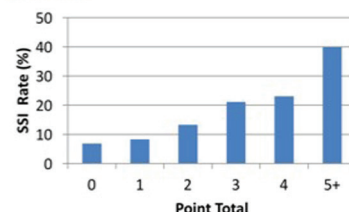
**Results/Outcome(s):** Our 2010-16 database showed an infection rate of 19.7% (289 / 1759 patients), which is well above the NHSN benchmark. These numbers were particularly startling given the overall health of the cohort: patient age 60 years old (SD 12.7), females: 56.5%; Caucasian: 93.5%; active smokers:16%, diabetics: 7.9% steroids: 6%. These high rates may be partly explained by fact that 235 patients (13.4%) presented to OR emergently, and 76 (9.4%) had an abscess at the time of OR. Of urgent operations, 133 patients underwent Hartman procedures (6 lap), and 38 (16%) received diverted anastomoses. Nonetheless, almost all (97.8%) had complete closure of their wounds at time of operation and no stomas were performed in 75.6% of operations (27 % in emergent cases). Average LOS was 6.9 days (SD 7.01), 30 day mortality was 1.5%, and anastomotic leak rate was 2.9%. We identified several SSI predictors, and developed and validated the “PREVENT (Prediction and Enaction of Prevention Treatments) Trigger Scale” (c=.716). Our PREVENT trigger scale (figure) shows that most SSI predictors are not modifiable, with one exception: creation of protected anastomoses in emergent settings appeared to increase SSI rates twofold (scale points=2). When more than five of our identified risk factors are present, predicted SSI rates increase more than sixfold to 39.9%.

**Conclusions/Discussion:** Several non-modifiable risk factors lead to high rates of postoperative SSI in healthy patients with diverticulitis. Cumulatively, these factors can produce rates of infection as high as 40%. Identifying these high-risk patients with the PREVENT trigger scale may allow initiation of intensified postoperative care to mitigate effects on patient recovery. Interestingly, current CMS and NHSN hospital reimbursement pay for performance formulas do not account for most of these risk factors.

Variable	Points
Age 70+ vs <70	1
Obese BMI>30	2
COPD	3
Indication for surgery: abscess	3
Emergent Surgery	3
ASA Class 3,4	1
Long surgery >3hrs	1
Primary anastomosis with diversion	2

A. PREVENT Trigger Scale Scoring Algorithm

Points	n	SSI Rate
0	375	6.90%
1	351	8.30%
2	361	13.30%
3	294	21.10%
4	160	23.10%
5+	218	39.90%



B. Observed Rates of Surgical Site Infections Based on PREVENT Scale Scores

PREVENT Trigger Scale

## EARLY ENTERAL FEEDING IS SAFE IN PATIENTS UNDERGOING URGENT COLORECTAL SURGERY.

P26

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**Purpose/Background:** Early enteral feeding after elective major colorectal surgery is safe and improves surgical outcomes and postoperative hospital stay. However, safety of early feeding after urgent and emergent operations has not been established. The aim of this study was to evaluate the safety of and factors influencing early enteral feeding after urgent and emergent major colorectal surgery. We hypothesized that early feeding is associated with shorter hospital stay after urgent and emergent colorectal surgery.

**Methods/Interventions:** A retrospective review of urgent and emergent major colorectal operations performed by two colorectal surgeons at our institution over a 2-year period beginning August 2014 was conducted. Urgent surgery was any surgery performed within 24 hours of the decision to operate and emergent surgeries were those requiring immediate operation. Early feeding included enteral diet started on postoperative day (POD) 0 or 1 and late feeding was enteral diet on or after POD 2. Preoperative variables, gastrointestinal outcomes and complications were compared between patients fed early or late. Fisher's exact test and Mann-Whitney test were performed for categorical and continuous variables and  $p < 0.05$  was considered statistically significant.

**Results/Outcome(s):** 53 patients (27 males) with median age 56 years (range: 16 – 89) underwent 35 (66%) urgent and 18 (34%) emergent operations. 10 (19%) operations involved the small bowel, 13 (24%) right colon, 27 (51%) left colon or subtotal colectomy, and 3 (6%) rectum. Most patients (74%) were fed early on POD 0 (13; 25%) or POD 1 (26; 49%). First diet ordered was clear liquids in 28 (53%) and solids in 21 (39%). Median time to tolerating solid diet was 3 days (range: 0 – 21). Patients who were fed early were younger (44 yrs. vs. 63 yrs.;  $p = 0.004$ ), less likely to have preoperative bowel perforation (13% vs. 43%;  $p = 0.049$ ), and less likely to have emergent surgery (23% vs. 64%;  $p = 0.009$ ). Patients who were fed early tolerated regular diet sooner (POD 2 vs. POD 4;  $p = 0.001$ ) and had a trend toward shorter hospital stay (7 days, range: 1 – 37 vs. 13 days, range: 5 – 21);  $p = 0.1$ . The most common reason for late feeding was postoperative sepsis or mechanical ventilation (57%). Rate of postoperative ileus and complications were similar in patients fed early (31% and 56%) and late (29% and 50%;  $p = \text{NS}$  for both).

**Conclusions/Discussion:** Early enteral feeding after urgent colorectal surgery appears safe and improves postoperative hospital stay while emergent surgery or complicated postoperative course may impede early feeding.

## THE VALUE OF CT SCANNING FOLLOWING CURATIVE RESECTION FOR COLORECTAL CANCER.

P27

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**Purpose/Background:** Colorectal cancer is a major cause of morbidity and mortality worldwide and is the second most common cause of cancer death in the UK. The aim of follow up after curative resection is to identify surgically treatable recurrence. There is widespread heterogeneity in follow up regimens used in clinical practice. Intensive follow up is commonplace but is based upon limited evidence and the role of each follow up modality (clinical, serum carcinoembryonic antigen testing, intensive imaging, and endoscopic surveillance) remains unclear.

**Methods/Interventions:** All patients presenting to the department of colorectal surgery at Manchester Royal Infirmary up to 1<sup>st</sup> September 2013 were identified through electronic patient records and clinical case notes. All patients who underwent segmental colonic resection by a single surgeon with curative intent were included in the study. Recurrence rates (locoregional and distant), median time to recurrence and overall survival patterns were compared by Dukes Stage. National Hospital Episode Statistics (HES) Data was used to determine deaths related to colorectal cancer. Statistical analysis was undertaken using SPSS version 22. Chi-squared testing was performed for binary or categorical data. Time to recurrence was analysed using the Kaplan Meier method and time to recurrence were compared using the log rank mantel cox statistic.

**Results/Outcome(s):** 210 patients were included in the study. Mean age 64.4 years. 126 patients (60%) were male. CT scans were performed at 6, 12, 18, 24, 36, 48 and 60 months following resection. Overall, 4.5% of all CT scans performed detected disease recurrence in 60 patients (29.4%) patients. Greatest incidence of disease recurrence was detected at 6 months and 3 years post op. Only 5% of all patients developed disease recurrence during the fourth and fifth years post resection. 5.2% of patients developed local recurrence. Patients who received postoperative chemotherapy were less likely to develop recurrent disease ( $p = 0.008$ ). There was no correlation between Dukes Stage and local or regional recurrence ( $p = 0.66$ ). 10.5% of all patients (22/210) underwent surgery with curative intent for recurrence.

**Conclusions/Discussion:** This is the first paper to validate the findings of a UK multicenter national randomised control trial of follow up in patients with colorectal cancer. Intensive CT imaging is pragmatic and a readily available follow up modality in clinical practice. Of the 60 patients with recurrent disease, a high proportion (22/60, 36.6%) had surgically treatable recurrence As patient expectations

increase, colorectal cancer specific outcomes are also improving. It seems likely that further improvements in outcomes will result from aggregation of marginal gains. This study demonstrates the value of intensive CT follow up as an incremental gain in this high-risk population.

### EFFECTS OF NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM COLORECTAL SURGERY CLASSIFICATION SCHEMES ON REPORTED PERIOPERATIVE SURGICAL SITE INFECTION.

P28

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**Purpose/Background:** Surgical site infections after colon and rectal surgery are exceedingly common and represent a potentially preventable source of morbidity, mortality, and resource expenditure. The American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) is a valuable data source for clinicians and hospital systems driving quality improvement interventions, particularly in areas where payers incentivize providers to improve quality through reimbursement. One such area of focus is postoperative surgical site infection. Current Procedural Terminology (CPT) code-based data abstraction for colon and rectal surgery lacks procedural granularity and misclassification rates are unknown. The aim of this study is to determine whether ACS-NSQIP abstraction methods accurately classify colorectal operations, and if so, whether the misclassification affects reported rates of surgical site infections.

**Methods/Interventions:** This single-institution retrospective cohort study used the ACS-NSQIP colectomy-targeted participation user file to perform a semi-automated re-classification (SAR) of Colectomy and Proctectomy cases performed by colorectal surgeons. The pre-defined re-classification scheme included shifting all lower pelvic anastomosis procedures to the Proctectomy cohort with manual review of operative reports for CPT 44145 and 44207. All patients were grouped by level of anastomosis as described by the surgeon in the operative report. We then compared perioperative surgical site infection outcomes among the NSQIP and SAR classification schemes with the primary outcome being deep/organ-space infections.

**Results/Outcome(s):** Of 1,063 patients from January 2011 to July 2016, the Colectomy and Proctectomy groups under NSQIP contained 849 and 214 patients respectively, and under SAR consisted of 650 and 413 patients respectively ( $p < 0.001$ ). The Colectomy group defined by SAR had a lower rate of deep/organ space infections than that defined by NSQIP (4.5% vs. 7.1%,  $p=0.034$ ).

**Conclusions/Discussion:** ACS-NSQIP has transformed surgical quality improvement, resulting in significant strides in patient care. These findings highlight the challenges of

CPT code-based patient classification and subsequent outcomes analysis, due to lack of granularity in procedural codes and variation in coding practices among colorectal surgery practices. Expanding the CPT code base to more accurately represent colon and rectal operations would allow for more accurate outcomes data reported by ACS-NSQIP. The advantages and limitations of this powerful dataset must be considered as the implications of its interpretation become more profound.

Surgical site infection	Colectomy		Sig	Proctectomy		Sig
	NSQIP	SAR		NSQIP	SAR	
Superficial	Yes	40 (4.7%)	32 (4.9%)	14 (6.5%)	22 (5.3%)	0.535
	No	809 (95.3%)	618 (95.1%)	200 (93.5%)	391 (94.7%)	
Deep/Organ space	Yes	60 (7.1%)	29 (4.5%)	27 (12.6%)	58 (14%)	0.621
	No	789 (92.9%)	621 (95.5%)	187 (87.4%)	355 (86%)	

### COLON AND RECTAL SURGERY SURGICAL SITE INFECTION REDUCTION BUNDLE: TO IMPROVE IS TO CHANGE.

P29

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**Purpose/Background:** Surgical site infections (SSI) are a major cause of morbidity and mortality after colon and rectal surgery, increasing healthcare costs considerably [1]. Despite the introduction and implementation of the Surgical Care Improvement Project (SCIP), SSIs remain a source of morbidity [2]. The aim of this study is to determine the value of implementing a colon and rectal surgery SSI reduction bundle on SSI rates at our hospital. The bundle was based on core SCIP guidelines supplemented by several adjunctive multidisciplinary interventions in the pre-, intra-, and postoperative phases. [1] Cima R, Dankbar E, Lovely J, Pendlimari R, Aronhalt K, Nehring S, Hyke R, Tyndale D, Rogers J, Quast L, Team CS. Colorectal surgery surgical site infection reduction program: a national surgical quality improvement program driven multidisciplinary single-institution experience. *Journal of the American College of Surgeons*. 2013 Jan 31;216(1):23-33 [2] Stulberg JJ, Delaney CP, Neuhauser DV, Aron DC, Fu P, Koroukian SM. Adherence to surgical care improvement project measures and the association with postoperative infections. *Jama*, 2010;303(24), 2479-2485

**Methods/Interventions:** This is a retrospective analysis of a prospectively maintained database at a tertiary care affiliate community hospital looking at SSI rates before, during and after the implementation of the colon and rectal surgery bundle. Using both institutional data and ACS NYSQIP data, SSI rates were identified in patients undergoing colon and rectal operations between 2011 and 2016. Patients were grouped as pre-bundle (group A, January 1, 2011-December 31, 2012), implementation phase (group B, January 1, 2013-December 31, 2014) and post-bundle (group C, January 1, 2015-September 1, 2016). Primary endpoints were superficial SSI (sSSI), deep

SSI (dSSI), organ space SSI (OSSI) and total infection (TI).

**Results/Outcome(s):** A total of 1,333 patients underwent colon and rectal surgery between 2011 and 2016. Patient characteristics (Age, BMI, steroid use) were similar between the three groups. There was no significant reduction in sSSI, dSSI, OSSI or TI when comparing groups A and B. However, as bundle compliance improved, comparing groups B and C, there was a significant reduction in sSSI (6.6% to 4%,  $p < 0.05$ ), dSSI (3.7% to 1.1%,  $p < 0.05$ ), and TI (13.8% to 8.8%,  $p < 0.05$ ). Additionally when directly comparing the pre-bundle to the post-bundle group there was a significant decrease in total infections (13.4% to 8.8%,  $p < 0.05$ ).

**Conclusions/Discussion:** Implementation of the SSI reduction bundle resulted in a reduction in overall SSI rates, including superficial and deep wound infections. Regular feedback and education meetings led to an increase in compliance amongst the nursing staff, anesthesia and the perioperative staff, leading to increased compliance and improved outcomes. This study offers evidence that small changes can lead to significant decreases in surgical site infections.

**IMPACT OF OPERATIVE TIMING FOR ACUTE DIVERTICULITIS ON SEPSIS AND MORTALITY.**

P30

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**Purpose/Background:** Ideal operative timing for non-emergent, acute episodes of diverticulitis remains unclear. Medical management is initially utilized in an attempt to convert a higher risk urgent surgery to a less morbid elective surgery, or in some patients, to avoid surgery all together. A proportion of patients fail this treatment and require urgent colectomy during admission for their acute diverticulitis attack. In an effort to evaluate the factors relevant to the development of sepsis and mortality in these surgical patients, we conducted a retrospective study using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP), focusing on whether an increase in inpatient hospital days prior to surgery is detrimental.

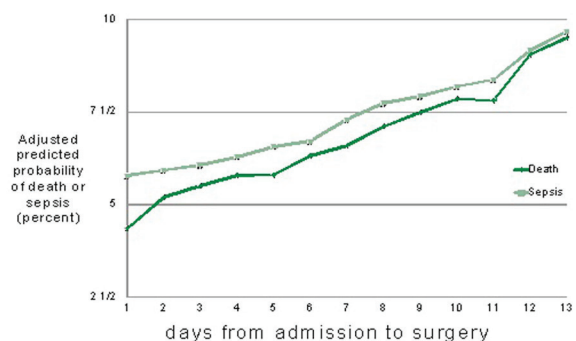
**Methods/Interventions:** Patients from the ACS-NSQIP database who underwent colectomy, with a primary diagnosis of diverticulitis (ICD-9 code 562.11 and 562.13),

between 2005 and 2014, were included. Age, gender, race, BMI, history of diabetes, COPD, or MI, smoking history, alcohol use, functional status, ASA classification, operative time, operative approach, and days to operation, were analyzed, to see their combined effect on death and sepsis in these patients. A propensity score was calculated, using these factors, to adjust the effect of time to operation on death and sepsis. Recursive partitioning was used to determine if a significant cut point number of days existed, from admission to surgery. Patients operated on hospital day 0 were excluded, as they were likely either elective or emergent cases.

**Results/Outcome(s):** 16,370 patients underwent colectomy for acute diverticulitis on hospital day 1-20. The mean age of the population was 65.36 years and the mean time to operation was 5.03 days. Days to operation was found to be a significant predictor for death and sepsis ( $p < 0.01$ ) (Figure 1). Adjusted for the other factors, the odds ratio (OR) for death was 1.016, indicating a 1.16% increase in death per day, each day surgery was not done ( $p < 0.001$ , 95%CI). The cut point for death was 9 days (OR 1.381,  $p < 0.0001$ ). The OR for sepsis was 1.028 ( $p < 0.0001$ ). The cut point for sepsis was also 9 days (OR 1.686,  $p < 0.001$ )

**Conclusions/Discussion:** Operative timing for patients with non-emergent, acute diverticulitis has a significant impact on sepsis and mortality. While we may try non operative approaches, with each additional day operative therapy is delayed there is a significant negative impact on morbidity and mortality. This data suggests that surgeons should pursue operative therapy earlier in the hospital course to improve patient outcomes. Although operating before 9 in-hospital days is recommended statistically, mortality and sepsis appear to increase steadily each day surgery is contemplated and not done.

Figure 1



**P29 Colon and Rectal Surgery Surgical Site Infection Reduction Bundle Wound Occurrences**

Wound Occurrences (n,%)	Group A	Group B	Group C
Superficial SSI	26, (6.1)	30, (6.6)	18, (4)
Deep SSI	11, (2.6)	17, (3.7)	5, (1.1)
Organ Space SSI	20, (4.7)	16, (3.5)	17, (3.7)
Total Infection	57, (13.4)	63, (13.8)	40, (8.8)



**LYMPH NODE HARVEST AND LENGTH OF STAY ARE IMPROVED IN OVERWEIGHT AND OBESE PATIENTS WHO UNDERGO ROBOTIC ASCENDING COLECTOMY WITH INTRACORPOREAL ANASTOMOSIS.**

P31

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**Purpose/Background:** A growing body of research questions whether obese individuals receive high quality cancer surgery as defined by indicators such as lymph node harvest. This may be due to increased technical challenges of operating in the obese population. Our primary aim was to determine if a robotic operative approach with intracorporeal anastomosis (ICA) would improve the number of lymph nodes harvested in the obese population. The secondary aim was to determine if surgical approach affected length of stay in the overweight and obese population.

**Methods/Interventions:** A retrospective review was conducted of all patients who underwent laparoscopic and robotic ascending colectomy from January 2012 to October 2016 by a single surgeon. Mean and standard deviation of lymph node harvest, type of dissection (medial-to-lateral [ML] vs. lateral-to-medial [LM]), type of anastomosis (extracorporeal [ECA] vs. ICA), discharge day, and patient demographics were compared. All patients were part of an enhanced recovery protocol as well.

**Results/Outcome(s):** All robotic and laparoscopic ascending colectomy procedures performed by a single surgeon were reviewed. Of these, sixty-eight procedures were performed on overweight and obese patients. Fourteen of these procedures were performed laparoscopically with LM dissection with ECA, 9 were performed laparoscopically with ML dissection with ECA and 45 procedures were performed robotically with ML dissection with ICA. Procedures were performed for neoplastic processes and underwent oncologic resection. On final pathology, 27 overweight and obese patients had invasive adenocarcinoma vs. 41 patients who had benign disease. Overall, in obese and overweight patients (BMI >25), average lymph node harvest in LM dissection with ECA was 14.4 lymph nodes (STD 5.02) vs. 21.9 lymph nodes (STD 10.3) in robotic ML dissection with ICA ( $p < 0.03$ ). In the robotic ML ICA group, day of discharge was also significantly improved with a mean of 3.1 days (STD 1.04) vs. 5.2 days (STD 1.85) ( $p < 0.000002$ ).

**Conclusions/Discussion:** In the overweight and obese population, patients who underwent a ML dissection with intracorporeal anastomosis robotically had a superior lymph node yield when compared to the laparoscopic group with LM and extracorporeal anastomosis. This group also demonstrated a reduction in length of stay.

**ANALYZING TRENDS AND MODIFIABLE RISK FACTORS FOR ILEOSTOMY AND COLECTOMY REVERSAL USING THE ACS-NSQIP DATABASE.**

P32

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**Purpose/Background:** Anecdotal evidence suggests that over 1,000,000 individuals in the United States currently live with either an ileostomy or colostomy. Furthermore, over 60,000 new stomas are placed annually but, on average, only half are reversed. This analysis focuses on delineating the incidence of postoperative complication following stoma reversal and identifying preoperative modifiable risk factors to optimize care.

**Methods/Interventions:** The 2014 ACS-NSQIP database was queried for primary CPT code to establish a cohort of patients who had undergone elective closure of either an ileostomy or colostomy (CPT 44227, 44620, 44625, 44626) and had a postoperative ICD9 diagnosis code indicating either an ileostomy or colostomy status (VV44.2, VV44.3, VV55.2, VV55.3). All cause morbidity and wound specific morbidity was then reviewed and modifiable risk factors were identified. Statistical analysis was performed using independent sample t-testing and binomial regression modeling.

**Results/Outcome(s):** The search criteria yielded a cohort of 24823 stoma reversals between 2005 and 2014 at a site participating with ACS-NSQIP. Within this cohort, 1636 (6.2%) patients underwent a laparoscopic stoma reversal, 14722 (58%) patients underwent ileostomy reversal and 10766 (42%) patients underwent colostomy reversal as their primary procedure; 14.2% had a clinically significant morbid event within 30 days of surgery, 11% of which were wound related. In general, individuals who underwent a laparoscopic stoma reversal had 4% fewer overall and wound complications ( $p = 0.001$ ) compared to laparotomy. Furthermore, ileostomy reversal by either means was also associated with a 4% reduction in both overall and wound related complication compared to colostomy reversal ( $p < 0.001$ ). Regression analysis for modifiable risk factors showed that insulin usage (HR 1.32  $p < 0.001$ ), smoking (HR 1.43  $p < 0.001$ ), shortness of breath (HR 1.379  $p < 0.001$ ), dialysis (HR 2.755  $p < 0.001$ ), chronic steroid use (HR 1.362  $p < 0.001$ ) and BMI > 30kg/m<sup>2</sup> (HR 1.559  $p < 0.001$ ) in the preoperative period were positive risk factors for all cause morbidity. A similar regression analysis for wound related complications also implicated smoking (HR 1.341  $p < 0.001$ ), BMI > 30kg/m<sup>2</sup> (HR 1.584  $p < 0.001$ ), Dialysis (HR 1.783  $p < 0.018$ ) as positive modifiable risk factors.

**Conclusions/Discussion:** A degree of preoperative optimization is possible for elective ileostomy and colostomy reversals. Despite this, our analysis of stoma reversals reported to the ACS-NSQIP database suggests that the rate of postoperative complication averages 14%.

We believe that preoperative modification of comorbid conditions like smoking, obesity and renal disease can help reduce both wound complications and overall morbidity in the 30-day postoperative period.

### COMPARISON OF LAPAROSCOPIC VERSUS OPEN HARTMANN REVERSAL PROCEDURE: A SYSTEMATIC REVIEW AND META-ANALYSIS.

P33

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**Purpose/Background:** Hartmann's reversal (HR) is major surgery to restore colonic continuity. Traditionally it is undertaken by open surgery (ROH), with a morbidity and mortality of up to 50% and 15% respectively. Due to the significant post-operative risk, there is a trend towards performing laparoscopic reversal of Hartmann's procedure (LRHP). There has been inconsistent reports with respect to the safety and superiority of laparoscopic versus open approach, hence the aim of this study was to perform a systematic review and meta-analysis to compare laparoscopic versus open reversal of Hartmann's with respect to morbidity and mortality rate.

**Methods/Interventions:** A systematic search of all medical search engines, including PubMed, EMBASE and ClinicalKey was performed, between 1970 to 2016. The search headings used in combinations were (MeSH terms): "open surgery", "major surgery", "laparoscopy", "minimally invasive", "reversal Hartmann's", and "bowel restoration." The eligibility criteria are comparative study of the outcomes between laparoscopic and open reversal of Hartmann's, with the intention-to-treat, and a sample size of at least 15 or more patients. The primary outcome measure in this study was 30-day morbidity rate, and the secondary outcomes were 30-day mortality, length of stay, operation time, estimated blood loss, re-operation, and days to flatus.

**Results/Outcome(s):** Eighteen studies were identified, comprising a total of 7824 patients, 1586 in laparoscopic group and 6238 in open group. There was no statistical difference in terms of mean operative time (200.7 mins vs 196.3 mins) between two groups. The conversion rate from a laparoscopic to open approach was 7.1%. Overall morbidity was higher in the open group versus laparoscopic group (27.9% vs 16.7%,  $p < 0.0001$ ), however subgroup-analysis showed that there is increased risk of sepsis (6.1% vs 3.1%;  $p < 0.0001$ ), wound infection (18.4% vs 11.2%;  $p < 0.0001$ ), pulmonary complications (2.8% vs 1.8%;  $p = 0.038$ ), urinary tract infection (2.5% vs 1.5%;  $p = 0.025$ ) and ileus (11.8% vs 5.2%;  $p = 0.001$ ) in the open compared to laparoscopic approach. Mortality rate was lower in the laparoscopic group (0.5% vs 0.2%  $p=0.1$ ).

**Conclusions/Discussion:** Laparoscopic reversal of Hartmann's has a lower risk of mortality and a shortened length of stay when compared to an open approach. There is a moderate rate of conversion and it is likely that appropriate case selection is important.

### AN ENHANCED RECOVERY PROGRAM RESULTS IN IMPROVED OUTCOMES AFTER MAJOR COLON RESECTION.

P34

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**Purpose/Background:** With the commitment to provide comprehensive healthcare, the implementation of an Enhanced Recovery After Surgery (ERAS) program may be a solution for improving post-surgical care. This study aimed to evaluate the influence of an ERAS Program on length of stay and complications after major colon surgery.

**Methods/Interventions:** An ERAS protocol was launched at a single, tertiary center in January 2015. A prospectively maintained clinical database was retrospectively reviewed. All patients who underwent colon resection prior to ERAS implementation (January 2012 to December 2013) were compared to those who had a colon resection after ERAS implementation (January 2015 through December 2016). Inclusion criteria included age  $\geq 18$  and patients who underwent a right or extended right hemicolectomy (RH) or anterior resection (AR). Exclusion criteria included pregnant women, ASA class  $\geq V$  and emergent surgery. Primary outcome measures included length of stay (LOS), any postoperative complication [e.g. reoperation, surgical site infection (SSI), *clostridium difficile* infection, urinary tract infection, perioperative cardiac event, pneumonia, anastomotic leak, pressure ulcer development, postoperative ileus, bowel obstruction, thromboembolism and death] and post-discharge complications (emergency department visit, readmission, surgical site infection).

**Results/Outcome(s):** 224 patients met inclusion criteria. Of these, 144 (64%) patients underwent colon resection prior to ERAS implementation (AR: 54%) and 80 (36%) patients after ERAS implementation (AR: 36%). There was no significant difference in age, gender, race, BMI, immunosuppression, diabetes history, ASA class and wound classification between the pre and post-ERAS groups. Following ERAS implementation, LOS significantly decreased for all patients (all procedures 3.7 vs 4.9 days,  $p < 0.01$ ; AR 4.4 vs 5.4 days,  $p = 0.03$ ; RH 4.6 vs 5.6 days,  $p = 0.02$ ). Overall postoperative complications also significantly decreased from 28% (n=41 patients) to 15% (n= 12 patients,  $p = 0.02$ ). Subgroup analysis of individual complications did not differ significantly, however postoperative ileus decreased from 10% to 6%

and SSI from 6% to 3%. On multivariate regression analysis, an ERAS program and the presence of a postoperative complication independently remained significantly associated with LOS ( $p < 0.01$ ). A decrease in the post-discharge complication rate (17% vs 11%,  $p = 0.20$ ) was also noted following implementation of ERAS, which was clinically, although not statistically significant.

**Conclusions/Discussion:** The implementation of an ERAS protocol reduced LOS and decreased postoperative and post-discharge complications. This study demonstrates an enhanced recovery pathway is a valuable armamentarium for providing comprehensive quality care to patients undergoing major colon resection.

### PATIENT SATISFACTION WITH TRANSANAL SUTURED REPAIR OF RECTOCELE: ARE THEY SATISFIED AND DOES SATISFACTION CORRELATE WITH IMPROVEMENTS IN OBSTRUCTIVE DEFECTION AND ANAL INCONTINENCE?

P35

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**Purpose/Background:** Rectocele is one component of obstructive defecation syndrome (ODS) that can be surgically corrected. Patients with rectocele may also have fecal incontinence (FI) with or without anal sphincter disruption. The objectives of this project are to evaluate patient satisfaction with a sutured repair of rectocele - transanal plication of anterior rectal muscularis (TPARM) and correlation between satisfaction with TPARM and validated scoring systems for ODS and FI.

**Methods/Interventions:** We examined the records of 109 women with symptomatic rectoceles confirmed by defecography and who underwent TPARM between January 2011 and November 2014. We collected preoperative Altomare ODS score, fecal incontinence severity index (FISI), mean age, sphincter integrity on anal ultrasound, and noted other anorectal operations performed along with TPARM. We administered a telephone and written questionnaire to these women wherein we assessed satisfaction with TPARM, willingness to recommend the surgery to others, postoperative Altomare ODS score and FISI.

**Results/Outcome(s):** Fifty-five women responded to our questionnaire. We did not exclude women who had sphincter disruption or who had additional anorectal surgery. Twenty-seven women had other anorectal operations, including single or multi-quadrant hemorrhoidectomy, lateral internal sphincterotomy, and combinations of the above. Amongst the 44 women with a history of vaginal deliveries 18 had a sphincter defect. Mean follow-up time was 1076 days (range 377-1726 days). The mean pre and post-operative ODS scores were 11.7 and 5.3. The mean

pre and post-operative FISI were 18.9 and 10.9. Forty-two (79%) were satisfied with the surgery. Forty-one (77%) were willing to recommend the surgery to others. There was a correlation between change in ODS score and patient satisfaction ( $-0.547$ ,  $p < 0.001$ ) and between change in FISI and patient satisfaction ( $-0.392$ ,  $p = 0.004$ ). There was no difference in mean change in ODS score ( $p = 0.562$ ), FISI ( $p = 0.375$ ), or satisfaction score ( $p = 0.985$ ) in women who had additional anorectal procedures. There was also no difference in these same three scores between women with and without anal sphincter disruption ( $p = 0.634$ ,  $p = 0.888$ ,  $p = 0.789$ ).

**Conclusions/Discussion:** TPARM is associated with a high level of patient satisfaction, which correlates with decreases in both obstructive defecation and incontinence. These favorable results apply to patients with sphincter disruption and those who underwent other anorectal operations.

### SACRAL NERVE STIMULATION: DOES OPTIMAL LEAD PLACEMENT MATTER?

P36

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Cleveland, OH

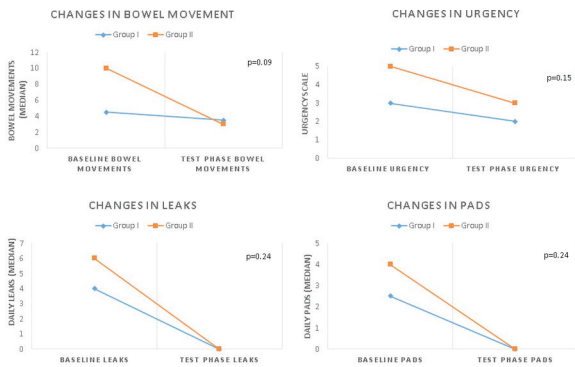
**Purpose/Background:** Sacral nerve stimulation (SNS) is an option for patients with severe fecal and urinary incontinence. SNS consists of a 2- week test phase (Stage I) followed by full implant (Stage II) A response in at least 1 of the 4 electrodes is necessary for functional improvement. Responses in multiple electrodes at an amplitude lower than 2mV suggests close proximity between the lead and nerve root and provides maximal programing options. A previous study demonstrated that the curve stylet provide more electrode contacts at lower amplitudes and consequently longer battery life. However, few studies assessed the optimal implantation technique for patient with FI. The aim of this study was to assess whether motor response at an amplitude  $\leq 2$ mV in the greatest number of leads impacts fecal incontinent episodes.

**Methods/Interventions:** Patients with an intention to treat analysis undergoing SNS were included in an IRB approved prospective study. During Stage I procedure, a curved stylet was used, and optimal lead placement, defined as the presence of response in toe and/or bellows at an amplitude  $\leq 2$ mV in as many leads as possible was standardized and performed in all patients. The patients were separated into two groups based on number of leads with motor response (bellows and/or toe) and amplitude. Group I (3/4 and 4/4 leads with amplitude  $\leq 2$ mV) and Group II (all other patients regardless the number of leads and amplitude). Patients undergoing PNE, re-implant or lead revision were excluded. Data regarding demographics, indications, baseline and test phase fecal incontinence status (bowel movements, urgency, number of pads and

fecal accidents), changes in SNS programs and amplitude and 30 days complications were collected.

**Results/Outcome(s):** Seventeen patients were recruited for SNS implantation during the study period, 8 patients in Group I and 9 in Group II. 15 (88%) patients had more than 50% improvement in fecal accidents and underwent Stage II. There were no significant difference between groups regarding gender (female 75 vs. 88.9%,  $p=0.58$ ), median age (60.7 vs 60,  $p=0.773$ ), BMI (26.5 vs. 25.3,  $p=0.92$ ) and ASA. Sphincter dysfunction was the main indication for implant in Group I (62.5%) while diarrhea, previous rectal surgery and sphincter dysfunction were observed in Group II (33.3%). Group I had a significantly lower implant time (41min vs 52,  $p=0.023$ ). At baseline there was no statistical difference in bowel movements, number of pads or leaks but fecal urgency score (1-5) was higher in Group II (3 vs 5;  $p=0.045$ ). Graph 1 shows the no significant changes in (BM, urgency, leaks and pads) from baseline to test phase. The 30-days complications (wound infection, pain and UTI) were similar between groups.

**Conclusions/Discussion:** Optimal lead placement was only achieved in half of the patients undergoing SNS but this was not associated with a better outcome. Lead placement that is not optimal can be associated with an acceptable improvement of fecal incontinence.



Graph comparing fecal incontinence status from baseline to test phase between groups.

Urgency scale (1 to 5)

**NEEDS ASSESSMENT AND DEVELOPMENT OF A SYNOPTIC MAGNETIC RESONANCE DEFECOGRAPHY REPORT FOR MULTIDISCIPLINARY MANAGEMENT OF PELVIC FLOOR DISORDERS.**

P37

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**Purpose/Background:** BACKGROUND: Dynamic magnetic resonance defecography (MRD) obtains images to evaluate rectal and pelvic muscle function and structure

during various stages of defecation. The study offers unique information on the presence and degree of pelvic floor abnormalities, including obstructive and dysenergetic defecation, constipation, and pelvic organ prolapse, and is a valuable component of the pelvic floor evaluation. While interest has been increasing, there is no consensus guideline in the US or standard report to guide use, describe results, or assist multidisciplinary management. PURPOSE: To develop a synoptic MRD report to standardize and translate results for the clinical treatment team.

**Methods/Interventions:** A multidisciplinary treatment team used a knowledge translation strategy and consensus guidelines to retrospectively review a series of existing studies/ reports, define the necessary elements, develop, and implement a synoptic MRD report.

**Results/Outcome(s):** After review of the European standards, the essential MRD reporting elements were defined for all compartments. Nine historic studies were reviewed. 0% included all defined components for evaluation of pelvic floor dysfunction. Specific issues in the reports reviewed were absence of standardization, varied reporting styles, lack of detail needed for complete evaluation of a parameter, and subjective assessment reported in lieu of specific measurements/ grading systems for prolapse, rectocele, and descent. Review found only 67% of historic reports included details needed to understand the functional state, and if an element was not commented on, the surgeons assumed it was not an issue. The MRD synoptic report was created in Powerscribe 360<sup>®</sup>. Using the newly developed synoptic MRD, the team reported ease of use, streamlined collection of data points and dictation, completeness of reporting, ease of understanding, and subjective improvement in the quality of information.

**Conclusions/Discussion:** The lack of standardization, exclusion of necessary elements, and subjective reporting highlighted the need for a synoptic MRD report. The developed report streamlined the reporting and interpretation processes, producing a complete, consistent report with clear diagnostic parameters. As seen in rectal cancer, a pelvic floor synoptic report has implications for increasing use of the MRD, creating a reporting standard, improving teaching, and facilitating understanding of the pathophysiology and management. Future study will assess the uptake, improvement in overall quality of information, and impact on clinical management with this new tool.

## RECTOPEXY WITHOUT RESECTION IS THE OPTIMAL SURGICAL APPROACH TO RECTAL PROLAPSE.

P38

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**Purpose/Background:** Multiple surgeries are performed to address rectal prolapse (RP), including perineal approaches (Delorme, Altemeier) and mesh or suture rectopexies with and without resection. Given the lack of consensus in management, we aimed to compare efficacy and safety of the different surgical procedures used for RP repair.

**Methods/Interventions:** This is a retrospective analysis of consecutive patients undergoing surgery for RP at a single institution from 2008 to 2016. The primary outcome was full-thickness rectal prolapse recurrence (RPR) after initial repair. RPR rates were compared between 3 groups: perineal repair (PR), abdominal non-resection rectopexy (NRR), and abdominal resection rectopexy (RR). Health status was assessed via Charlson comorbidity index and complications were graded with Clavien-Dindo morbidity scale. Univariable analyses were performed to compare groups with respect to demographics, complications, and length of stay (LOS), and to identify potential confounding risk factors for RPR. We used  $\chi^2$  for categorical and one-way analysis of variance with Bonferroni or Dunnett's post-hoc testing for continuous variables. We used Kaplan-Meier to estimate recurrence-free interval (months) and Cox proportional hazard ratios (HR) to compare RPR between groups. Results are presented as mean  $\pm$  standard deviation.

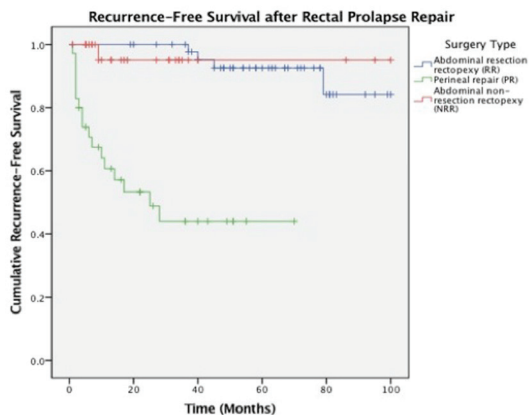
**Results/Outcome(s):** We analyzed 118 subjects with median follow-up of 40 months (1-100), including 38 PR, 48 RR and 32 NRR. The groups differed with respect to age (PR: 81.7 $\pm$ 8.3y; NRR: 66.7 $\pm$ 15.3y; RR: 61 $\pm$ 13.1y,  $P<0.001$ ) and Charlson comorbidity index (PR: 1.8 $\pm$ 1.7; NRR: 1.3 $\pm$ 1.8; RR: 0.8 $\pm$ 1.5,  $P=0.02$ ). Gender, race/ethnicity, body mass index, smoking, steroid use, prior radiation, connective tissue disorders, and preoperative fecal incontinence were similar between groups. Median time to RPR was 8 (1-79) months (Figure). RPR was most likely after PR (44.7%), followed by RR (8.3%) and NRR (3.1%),  $P<0.001$ , with no difference in RPR between RR and NRR (HR 0.7, 95%CI 0.1-6.6). Because of the frequency of RPR, the 38 PR subjects underwent 63 total procedures while the 80 RR and NRR subjects underwent only 82 operations (1.66 versus 1.03,  $p<0.001$ ). On univariable analysis, subjects who recurred were more likely to be smokers ( $P=0.01$ ), to have higher Charlson scores ( $P=0.045$ ), and to be over age 80 ( $P=0.02$ ), but none of these differences persisted after binary logistic regression controlling for surgery type. LOS in days after RR (4.6 $\pm$ 3.8) was longer than PR (2.7 $\pm$ 3.1;  $P=0.04$ ) but similar to NRR (2.9 $\pm$ 4.4;  $P=0.08$ ). There was a trend toward higher complication rate for RR (43.8%) compared to PR (23.7%) and NRR (21.9%),  $P=0.06$ .

**Conclusions/Discussion:** NRR has comparable perioperative morbidity to PR, without the high risk of RPR and need for additional procedures. Moreover, NRR has similar RPR rate to RR with a trend toward fewer complications. Thus, our data suggest that non-resection rectopexy is the optimal procedure for RP.

### P37 Needs Assessment- Defined Pelvic Floor Parameter

Defined Pelvic Floor Parameter	n addressing the parameter	% addressing the parameter
Pelvic Floor Evaluation with H & M Lines	8	89%
Evaluation at rest, tightening, bearing down, and evacuation	1	11%
Anorectal Angles	9	100%
Anterior Compartment:		
-Presence of Cystocele	8	89%
-Urethral incontinence during straining	0	0%
-Urethral hypermobility during straining	3	33%
Medial Compartment:		
-Uterus position	2	22%
-Uterine descent	7	78%
-Vaginal Prolapse	7	78%
-Enterocoele	6	67%
Posterior Compartment:		
-Intussusception	9	100%
-Rectal Prolapse	4	44%
-Rectal Fixation	8	89%
-Anorectal Junction Measurements	2	22%
-Rectocele (Degree or size)	8 (2)	89% (22%)

**Figure:** Comparison of recurrence-free survival in months after rectal prolapse repair between abdominal resection rectopexy, perineal repair, and abdominal non-resection rectopexy.



### PREDICTORS OF UNSUCCESSFUL BIOFEEDBACK TREATMENT FOR FECAL INCONTINENCE.

P39

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**Purpose/Background:** Biofeedback is an effective method of treatment for fecal incontinence and there are controversies regarding factors that may be correlated with its effectiveness. So, the aim of this study was to evaluate the efficacy of biofeedback (BFD) in the treatment of fecal incontinence (FI), identifying the predictive factors for unsuccessful treatment

**Methods/Interventions:** All patients with FI who underwent BFD therapy from 2012-2016 were identified from a prospective database. Symptoms were evaluated using Cleveland Clinic FI score before and 6 months after the completion of therapy. The clinical response to BFD treatment was evaluated according to the percentage of response to treatment and the patients were grouped: GI=As satisfactory (the FI score decreased  $\geq 50\%$ ) and GII:Unsatisfactory (the FI score decreased  $< 50\%$ ). Gender, age, score, previous vaginal delivery (VD), number of VD, previous anorectal and/or colorectal surgery, hysterectomy, menopause, anal pressures by anorectal manometry (resting, squeeze and capacity required to sustain squeeze pressure by 30 sec.), sphincter defect by 3D ultrasound and anismus were analyzed and correlated with the percentage of response after treatment.

**Results/Outcome(s):** A total of 136 patients (124 female) were included, 76 (56%) in GI and 60 (44%) in GII. The median score reduced from 10 to 5 ( $p=0.00$ ). FI score was lower in GI than GII (8 vs. 12,  $p=0.00$ ). Patients from GII had more previous vaginal delivery (77% vs 58%,  $p=0.02$ ) and surgery than GI (55% vs 32%,  $p=0.00$ ). The

mean sustain squeeze pressure was higher in GI than GII (70 vs 61 mmHg,  $p=0.01$ ). Patients from GI and GII had similar gender, ages (mean 64 vs 64y,  $p=0.81$ ), number of vaginal delivery (median 2 vs 2,  $p=0.38$ ), menopause (84% vs 83%,  $p=1.00$ ), hysterectomy (16% vs 08%,  $p=0.29$ ), the mean resting pressure (40 vs 36mmHg,  $p=0.13$ ), the mean maximum squeeze pressure (89 vs 85 mmHg,  $p=0.31$ ) as well as the median sustain squeeze pressure increased similar comparing before with after BFD (GI=70 to 86mmHg  $p=0.02$  vs. GII=61 to 78mmHg  $p=0.01$ ) and evidence of sphincter defect (external / and/ or internal anal sphincter) (26% vs 40%,  $p=0.09$ ).

**Conclusions/Discussion:** Biofeedback therapy shows effective treatment with 50% of reduced FI score in half of patients and the factors associated with unsuccessful outcome include the FI score  $\geq 10$ , previous vaginal delivery, previous anorectal and/ colorectal surgery and reduced mean sustain squeeze pressure by 30 sec. There was no correlation between age, number of vaginal delivery, hysterectomy, sphincter defect and a greater risk of unsuccessful treatment.

### DO WE REALLY NEED GAS INCONTINENCE SCORE FOR FECAL INCONTINENCE SCORES?

P40

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**Purpose/Background:** Fecal incontinence scores that are frequently used for the evaluation of the severity of fecal incontinence (FI) include Fecal Incontinence Severity Index (FISI), Cleveland Clinic Florida Fecal Incontinence Score (CCFIS) and St Mark's score (SMS). All of the three conventional FI scores contain an element of gas incontinence (GI), although gas is different from feces, and currently there is no specific treatment for GI. The aim of this study is to evaluate if the element of GI is necessary and useful in the three FI scores.

**Methods/Interventions:** The subjects were patients who visited our institute between June 2013 and September 2016, complaining of FI and completed the self-administered questionnaire for FISI (0:no FI - 61:worst FI), CCFIS (0:no FI - 20:worst FI), SMS (0:no FI - 24:worst FI) and a FI specific Quality of life (QoL) questionnaire that was the Japanese version of the Fecal Incontinence Quality of Life Scale (JFIQL, generic score 0:worst QoL - 4.1:best QoL). A retrospective analysis was performed with the data of these scores that were prospectively collected. The correlation coefficients between the generic score of JFIQL and each of the three scores were compared with those between the generic score of JFIQL and each of the FI three scores without GI score.

**Results/Outcome(s):** Out of the 397 patients with FI, 41 could not complete the questionnaire due to the insufficient intellectual ability, and therefore the remaining 356

patients formed the subjects of this study. The median age (range) was 69 years old (20 - 91), and 241 (68%) were female. The median scores (range) of FIS, CCFIS, SMS and the generic JFIQL were 18 (3 - 55), 10 (0 - 19), 11 (0 - 21) and 2.8 (1.1 - 4.1) respectively, whilst those of FIS without GI, CCFIS without GI and SMS without GI were 13 (0 - 44), 8 (0 - 15) and 9 (0 - 17), respectively. The correlation coefficients between the generic score of JFIQL and FIS, CCFIS as well as SMS were -0.27, -0.49 as well as -0.57 respectively, whilst those between the generic score of JFIQL and FIS without GI, CCFIS without GI as well as SMS without GI were -0.17, -0.46 as well as -0.56.

**Conclusions/Discussion:** It is well known that FI symptom severity does not necessarily correlate with FI specific QOL. Therefore, the correlation coefficient between JFIQL and FIS was very low with -0.27, while those between JFIQL and CCFIS as well as SMS were relatively high with -0.49 and -0.57, respectively because both of CCFIS and SMS contain elements reflecting QOL. According to the results of this study, however, the conventional FI scores including the element of GI were better correlated with the FI specific QOL score than the FI scores without GI in all the three scores. Therefore, the element of gas incontinence seems necessary and useful in the three conventional fecal incontinence scores in order to better reflect the fecal incontinence specific Quality of life.

#### SACRAL NEUROMODULATION FOR FECAL INCONTINENCE: FIVE YEAR EXPERIENCE.

P41

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**Purpose/Background:** Sacral neuromodulation has been used to treat urinary incontinence since 1997. In his seminal paper in 2010 Steven Wexner published a cohort of patients with fecal incontinence treated with sacral neuromodulation. In 2014 the American Society of Colon and Rectal Surgeons stated that sacral neuromodulation may be considered first line treatment for fecal incontinence for patients with and without sphincter defects. In this paper we report our experience with sacral neuromodulation for the treatment of fecal incontinence and analyze our outcomes

**Methods/Interventions:** This is a retrospective review performed at a specialty ambulatory referral center for colorectal diseases. Patients seen in the office for fecal incontinence who elected to have sacral nerve modulation between 2011-2015 are included. Neuromodulators were placed after initial nerve testing showed positive results. Patients were seen for at least 3-6 month follow-up after the study began. In order to assess efficacy of the SNS we calculated Cleveland Clinic Fecal Incontinence scores pre and post intervention.

**Results/Outcome(s):** There were a total of 46 sacral nerve insertions between 2011-2015. There were 5/45 stimulators removed for nonfunction and/or need for MRI. There were 31/45 patients who continued to follow-up in the office for sacral nerve modulation. The CCFI scores were analyzed using a paired t test to ascertain whether there was a significant difference in incontinence scores after sacral nerve modulation. Preoperative average score was 14.7 and postoperative was 5.2. The mean average decrease in CCFI scores was 9.93 (+/- 5.58 with  $p < 0.000115$ ) after the sacral nerve modulation. Also 28/31 (90%) had a decrease in CCFI score; 21/31 (68%) had a decrease in >50%. There was no correlation in patients with pudendal neuropathy towards a larger decrease in CCFI score ( $p < 0.12$ ). There was also no correlation in decreased CCFI score in patients who had a sphincter defect ( $p < 0.23$ ). The infection rate was 1/31 (3.2%)

**Conclusions/Discussion:** Our patient cohort showed a statistically significant decrease in CCFI score post-procedure as compared to pre procedure. These results demonstrate that sacral neuromodulation is a safe and minimally invasive treatment option for patients with fecal incontinence with excellent outcomes.

#### PREVALENCE OF PELVIC FLOOR DYSFUNCTIONS IDENTIFIED BY DYNAMIC ULTRASOUND AND THEIR RELATIONSHIP TO MODE OF DELIVERY, PARITY AND AGE.

P42

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**Purpose/Background:** There is still much controversy regarding the prevalence of pelvic floor dysfunctions and risk factors due to population studied and methodology applied. So, the aim of this study was to determine the prevalence of the pelvic floor dysfunctions among the female patients and correlate the age, mode of delivery and parity on these dysfunctions using dynamic 3D ultrasound (3D-US).

**Methods/Interventions:** All female patients with pelvic floor dysfunctions complaining of obstructed defecation, 53(6%) complained of fecal incontinence (FI) and evaluated by 3D-US from 2010-2016 were identified from a prospective database. To evaluate the relationship between the dysfunctions and age-related changes, the patients were stratified by mode of delivery (nulliparous, vaginal delivery-VD or caesarean section-CS) in decades. In the VD group, they were distributed by number of delivery (G1=1VD; G2=2VD; G3=3VD; G $\geq$ 4VD).

**Results/Outcome(s):** Of the 951 females with ODS, mean age 49y, 226(24%) had no deliveries (17/8% previous anorectal surgery and sphincter defect without

FI); 262(27%) underwent to CS(14/5% previous anorectal surgery and sphincter defect without FI and 2 with FI without defect) and 463(49%) had VD(126/27% sphincter defects, 20 previous anorectal surgery and 33 complained of FI and and 18 with FI without defect). The prevalence of pelvic floor disorders were 534(56%)rectoceles grade II or III; 356(37%) intussuseptions; 498(52%)anismus; 38(4%)entero-sigmoidoceles and 157(17%) sphincter defects. Age, vaginal delivery and higher parity did not increase the prevalence of rectocele and intussusception but the prevalence of entero-sigmoidocele was found increased with the age in a group of nulliparous( $p=0.04$ ). Otherwise, anismus decreased with age in a group of VD( $p=0.01$ ). The sphincter defect was found increased with the age in all groups( $p=0.00$ ) as well as with the number of VD( $p=0.02$ ) Table. A total of 33(3%) patients complaining of FI had sphincter defect and all of them in a group of VD.

**Conclusions/Discussion:** The study data demonstrate the prevalence of anatomical dysfunctions related to obstructed defecation such as rectocele, intussusception, entero-sigmoidocele are independently associated with the age, vaginal delivery and higher number of VD by 3D-US. Cesarean section has a protective effect, similar to nulliparity, on the development of the sphincter defects compared with occurrence and number of VD by 3D-US. On the other hand, there is a strong correlation between sphincter defect with increased age in all groups associate with anorectal surgery since that higher age increase the others risk factor of damage and may have an additive effect and lead to the subsequent development of continence disorders. The 3D-US makes possible identify

dynamic dysfunctions, visualize anatomical structures and to evaluate anal sphincter defects.

### THD GATEKEEPER - A NOVEL, SELF-EXPANDING INJECTABLE AGENT FOR FECAL INCONTINENCE.

P43

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**Purpose/Background:** Implantation of anal injectable bulking agents is a recognised treatment option for passive faecal incontinence, despite the limited data to support its efficacy. A pilot study was performed to assess the safety profile and effect on incontinence for THD Gatekeeper, a novel prosthesis that has the capacity to change shape and volume post-implantation.

**Methods/Interventions:** Twelve eligible patients received THD Gatekeeper implantation under general anaesthetic. Each patient had six prostheses implanted in the intersphincteric space using a specifically-designed introducer. Follow-up was performed at one week, four weeks and three months post-operatively. Vaizey score, Cleveland Clinical Faecal Incontinence Score (CCFIS) and Faecal Incontinence Quality of Life (FIQL) questionnaire was used to assess continence. Patients also underwent endo-anal ultrasound at follow-up to confirm implant positioning.

**Results/Outcome(s):** Baseline mean Vaizey scores and CCFIS were 19.3 and 14.9 respectively. There were no intra-operative complications. Minor discomfort and

### P42 Prevalence of Pelvic Floor Dysfunctions Identified by 3D-US

Total - 951 female	AGE GROUPS		
	20 To 39 y (172 patients)	40 To 59 y (449 patients)	≥ 60 (330 patients)
<b>RECTOCELE %</b>			
Nulliparous	41	70	39
Caesarean section-CS	52	62	69
Vaginal Delivery-VD	57	61	51
<b>ANISMUS %</b>			
Nulliparous	59	61	46
CS	57	59	41
VD*	51	55	31
<b>ENTERO-SIGMOIDOCELE%</b>			
Nulliparous †	2	3	10
CS	0	0	3
VD	9	3	7
<b>SPHINCTER DEFECT%</b>			
Nulliparous	2	7	16
CS	0	5	15
VD §	12	49	73

\* $p<0.01$  / † $p=0.04$  / §  $p=0.00$



bruising was reported in three patients, which had resolved by their one-week follow-up. There were no cases of perianal sepsis or anal ulceration. There was a single case of prosthesis extrusion at day four post-operatively, confirmed on ultrasound. Eleven patients have completed initial follow-up, with mean Vaizey scores and CCFIS of 13.6 and 11.9 respectively; however, this improvement did not reach statistical significance. Increase in FIQL scores across all domains also did not reach statistical significance.

**Conclusions/Discussion:** This is the first prospective study of THD Gatekeeper for faecal incontinence outside of Italy. This study demonstrates that our technique for THD Gatekeeper implantation is safe and feasible. Larger studies with long-term follow-up are required to accurately assess efficacy of this technique in improvement of incontinence symptoms and quality of life.

#### FECAL INCONTINENCE- ETIOPATHOGENESIS, SURGICAL MANGEMENT AND ITS OUTCOME: AN INDIAN EXPERIENCE.

P44

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**Purpose/Background:** Fecal incontinence is a debilitating condition and often makes the life miserable. The exact incidence, its etiopathogenesis and the treatment options are not available from India. The present study has been carried out with aim to know its etiological factors, surgical procedures and outcome in a tertiary care hospital from India.

**Methods/Interventions:** Retrospective analysis of prospectively maintained data of fecal incontinence patients, treated in a department of Surgical Gastroenterology from North India

**Results/Outcome(s):** Between 2004-2016, 38 patients of fecal incontinence (22 females and 16 males) in the age range of 14 -60 years, were treated in a tertiary referral hospital. The various etiological factors responsible for fecal incontinence were- obstetric injury in 24, road traffic accident in 7, iatrogenic injury in 5, and gunshot injury (assault) and idiopathic in one patient each. Preoperative investigations included anal manometry, endorectal USG, and MRI and barium study in addition to detailed history and clinical examination. All patients were initially treated conservatively including biofeedback. Three patients responded very well to the conservative treatment. 35 patients required surgical intervention. The various surgical procedures offered were - Anterior sphincteroplasty with levatorplasty in 23, anterior sphincterplasty alone in 3, anterior sphincterplasty with graciloplasty in 2, simple plication in 3 and post anal repair and Thiersch wiring in two patients each. Outcome was assessed by questionnaire method during follow up regarding the control of

symptoms as fully satisfied (excellent), satisfied to great extent (good), satisfied or not satisfied. Two patients were lost to follow. At a follow up period of 1 month to 10 years, 27 patients had either excellent or good effect on control of the symptoms while remaining 6 were satisfied with procedures.

**Conclusions/Discussion:** The most common cause of fecal incontinence in our series was obstetric injury (63%) followed by road traffic accident. Sphincteroplasty with or without levatorplasty was the procedure of choice with acceptable outcome. A large study and longer follow up is further required to validate these findings.

#### SACRAL NERVE STIMULATION IN FECAL INCONTINENCE: A SINGLE INSTITUTION EXPERIENCE.

P45

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**Purpose/Background:** In 1988, sacral nerve stimulation (SNS) was used to treat urinary dysfunction then later in 1995 for fecal incontinence (FI) by delivering a mild, non-painful electrical pulse to the sacral nerves. It has not been established how SNS improves FI. We presents results from a single center whereby 86 patients underwent SNS both in one stage placement and in the traditional two stage implantation.

**Methods/Interventions:** SNS is usually performed in a two-stage procedure, patients are evaluated with a stage one test phase, to evaluate the effectiveness of the stimulation. When improvement is noted, then the implantable generator (IPG) is connected at stage two. Three of the four surgeons performed SNS in 2 stage while one of the four performed single stage implantation. Patients are followed at 1 month, 3 months, 6 months and yearly thereafter.

**Results/Outcome(s):** A total of 86 patients underwent SNS from our group between 2012-2016. 49 of the 86 were performed as one stage after testing intra-operatively. The mean age was 64.4 (range 16-97 years). There were 80 women and 6 men. Median follow-up was 52 week (range 3-156 weeks). 86 patients had successful test phase and underwent implantation of the IPG. Median duration of the test phase was 10.1 days (range 6-60 days). There were no sepsis or infection. 4 patients had wire displacement and required replacement. Three patients had explanations for late failure, requirement of MRIs and APR relating to disease. Two patients needed repositioning from migration of IPG. No severe complications were reported.

**Conclusions/Discussion:** At our institution, SNS proves to be an effective treatment of fecal incontinence. This can be performed in both one stage or

two stage. The success rate is similar with one and two stages. The morbidity is extremely low but the benefit is high.

#### RECTOSIGMOID RESECTION AT THE TIME OF SACROCOLPOPEXY.

P46

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**Purpose/Background:** Up to 70% of women with pelvic organ prolapse (POP) have defecatory dysfunction), believed to be multifactorial in etiology and not always adequately treated with traditional surgery for prolapse. A small number of surgeons in both colorectal and pelvic reconstructive surgery believe that performing a sigmoid resection at the time of POP repair will improve defecatory symptoms. This practice is uncommon due to a paucity of safety and efficacy data. At our institution, a subset of patients with POP and internal rectal prolapse have undergone rectosigmoid resection at the time of sacrocolpopexy. Our aim is to describe our experiences with these patients and to illustrate that the combined surgical procedure may be performed with no significant peri-operative complications.

**Methods/Interventions:** This is a retrospective analysis of patients who underwent abdominal sacrocolpopexy with low anterior sigmoid resection and anastomosis for symptoms of pelvic organ prolapse and defecatory dysfunction between September 2009 and October 31, 2016.

**Results/Outcome(s):** 51 patients were identified who had undergone sacrocolpopexy with sigmoid resection and anastomosis. Demographic information is as follows expressed as median (range): age 52.2 years (41-69), parity 2 (0-9), BMI 23 (15-29), stage of prolapse 2 (2-4), follow up 3 weeks (3-247). 49/51 (96%) had at least one defecatory complaint: 49 (96%) reported constipation, 22 (43%) reported digital splinting to aid in bowel movements, 31 (60%) reported straining and 18 (35%) reported laxative use. All 51 patients were referred to colorectal surgery for further evaluation based on symptoms, physical exam or both. 45(88%) had MRI defecography and 42 of these patients had MRI confirmed diagnosis of internal rectal prolapse or intussusception. Intraoperative and immediate post-operative data are as follows expressed as median (range): surgical time 132 minutes (99-281), hospital stay 3 days (3-8), estimated blood loss 100 mL (50-750), change in hematocrit 6.9 % (1-12), highest recorded white blood cell count post operatively 11.5 (6-17). There were no intraoperative (cystotomy, enterotomy, transfusion) and no immediate postoperative complications (transfusion, fever requiring antibiotics, small bowel obstruction,

ileus, reoperation). 7(14%) patients required additional surgery (posterior colporrhaphy) for symptomatic rectocele within 1 year of their initial surgery. One patient underwent diagnostic laparoscopy one week after discharge for abdominal pain which revealed no significant findings and two patients was readmitted for an ileus which resolved with conservative management.

**Conclusions/Discussion:** We conclude that performing sigmoid resection at the time of sacrocolpopexy may be safe for patients with bowel dysfunction secondary to internal rectal prolapse. The presence of mesh in face of bowel resection does not increase the risk of infection

#### DELAYED ANASTOMOTIC LEAK PRESENTING AS AN ANASTOMOTIC BREAKDOWN AFTER CHEMORADIATION: A DELAY IN DIAGNOSIS OR LATE PRESENTATION?

P47

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**Purpose/Background:** Anastomotic leak (AL) after colorectal resection can be a devastating complication. Many factors have been shown to increase leak rates such as steroids and malnutrition, yet the effects of preoperative chemoradiation (CRT) are still unclear. There are studies which indicate preoperative CRT does not increase the risk of AL while others indicate that it may increase anastomotic complications. Despite the different conclusions, these studies do have a common thread, which is the short length of time after surgery when they noted the AL (30 days or less). From our center, we put forth this case review of two patients with delayed ALs who presented with anastomotic breakdowns months after their CRT and surgery.

**Methods/Interventions:** Chart review of patients from a University based hospital practice of multiple surgeons combined with literature review of ALs after CRT.

**Results/Outcome(s):** Our first patient is a 57 year old man who was diagnosed with invasive rectal adenocarcinoma and had preoperative CRT. He then underwent a low anterior resection (LAR) with diverting loop ileostomy. Post-operatively, he was diagnosed with an ulcer just proximal to the anastomosis and a leak seen on barium enema; this later resolved in 6 weeks and the patient had his ileostomy reversed. Four months later, the patient underwent a colonoscopy that demonstrated a new area of ulceration which persisted for over a year until he eventually presented with complete dehiscence of his anastomosis and pelvic sepsis requiring an emergent exploratory laparotomy and diverting ileostomy. Our second patient is an 88 year old man who had a remote history of colon adenocarcinoma which was treated with neoadjuvant CRT, LAR and diverting ostomy, and reversal who

presented to our office with a complaint of pelvic pain and bright red blood per rectum with incontinence. He was diagnosed with a disruption of his prior anastomosis and underwent an exploratory laparotomy and diverting loop colostomy. His post-operative course was complicated with recurrent intra-abdominal abscesses and persistent pelvis sepsis. Neither patient had evidence of recurrent cancer on multiple biopsies.

**Conclusions/Discussion:** There is no general consensus in the literature on whether pre-operative CRT leads to an increased risk of post-operative complications. In our colorectal population, we noted two patients who presented with anastomotic dehiscence months to years after their initial treatments who had persistent life-threatening complications. Both patients had co-morbid factors that affected wound healing but both demonstrated clinically adequate healing initially. This suggests that their delayed leak was caused by a more insidious factor, potentially the CRT. While this will not change the oncologic paradigm in treatment for colorectal cancers, it may help alert surgeons to this additional risk of a delayed AL with complete anastomotic dehiscence.

#### CLINICOPATHOLOGICAL CHARACTERISTICS AND OUTCOMES IN 42 ANAL FISTULA CANCER PATIENTS.

P48

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**Purpose/Background:** Anal fistula cancer is relatively rare and standard treatment is not well-established. The purpose of this study was to clarify the clinicopathological characteristics and outcomes of anal fistula cancer patients.

**Methods/Interventions:** We retrospectively reviewed the medical records of patients who had been clinically diagnosed with anal fistula cancer and had undergone surgery at our hospital between 1999 and 2013. Those with Crohn's disease or preexisting colorectal cancer were excluded. Clinical manifestation, diagnostic processes, operative procedures, pathological results, postoperative adjuvant treatment, and prognoses were analyzed.

**Results/Outcome(s):** This study included 40 men and two women with a mean age of 61.3. The clinical symptoms were induration or tumor in 18 patients, colloidal discharge in 12 patients, and anal pain in 11 patients. With regard to type of anal fistula, 7 were categorized as transsphincteric; 14 as posterior deep transsphincteric; and 15 as suprasphincteric. MRI was performed in 32 patients, and colloid collection or tumor findings suggesting anal fistula cancer were present in 29 patients (91%). Based on the results of colloid cytology, 24 of 28 cases were categorized as class V (86%). The main interventions entailed

abdominal perineal resection in 40 cases and radical pelvic exenteration in two cases. The postsurgical pathological results indicated mucinous adenocarcinoma in 32, tubular adenocarcinoma in eight and squamous cell carcinoma in two. All cases were T4 lesions and the surgical margin was positive in 20 cases. Lymph node metastasis was confirmed in five (11.9%). Two patients had postoperative chemotherapy (infusional 5-FU/Levofolinate or oral 5-FU). Nine patients with positive surgical margins had radiation postoperatively (60 Gy). Among those, only two patients developed local recurrence. During the follow-up period, there were 14 cases of recurrence (33%), local recurrence in 10 and lung metastasis in four. The total five-year survival rate was 83.5%.

**Conclusions/Discussion:** Although anal fistula cancer is rare and difficult to diagnose, colloid cytology and MRI are useful. The risk of lymph node metastasis is low, however, postoperative local recurrence is high because complete surgical excision is often difficult. The 5-year survival rate is over 80% and postoperative radiation may improve the prognosis.

#### METASTATIC PROSTATE ADENOCARCINOMA IN A PERIRECTAL LYMPH NODE AFTER LAPAROSCOPIC LOW ANTERIOR RESECTION FOR RECTAL CANCER: REPORT OF A CASE.

P49

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**Purpose/Background:** Lymph node metastasis to the mesorectum from sites other than rectum is extremely rare with only a few cases reported in the literature. We present a patient with metastatic prostate cancer diagnosed on final pathology after laparoscopic low anterior resection for rectal cancer.

**Methods/Interventions:** A 73 year old morbidly obese male with a BMI of 38.4 and a history of Type 2 Diabetes Mellitus, Hyperlipidemia and Hypertension presents with a rectal mass 7 cm from the anal verge. Biopsy proved low-grade invasive adenocarcinoma of the rectum. Staging revealed no evidence of metastatic disease.

**Results/Outcome(s):** The patient underwent an uneventful laparoscopic low anterior resection and diverting ileostomy with total mesorectal excision. Final pathology revealed rectal adenocarcinoma and one perirectal lymph node was positive for metastatic prostate adenocarcinoma. The patient's final pathology was T1N0M0. The patient's work-up for prostate cancer does not reveal any other prostate cancer outside the prostate gland. Recommendations for XRT were not followed and the patient has chosen to undergo hormonal castration.

**Conclusions/Discussion:** Prostate and colorectal carcinoma are two of the most common malignancies in men [14]. Due to the proximity of the two organs,

locally advanced prostate adenocarcinoma may involve the rectum or, as in this case, the perirectal lymph nodes [15-16]. The explanation for this is based on the fact that both organs share some of the lymphatic drainage to common pelvic lymph node groups [17]. The findings of metastatic prostatic cancer after a rectal cancer resection are very scattered, mostly limited to case reports. In a 10 year Analysis, Murray et al. [17] retrospectively studied a total of 112 rectal resections over a 10 year period for primary adenocarcinoma with findings of metastatic prostate cancer in 4.5 %. An interesting fact was that these lymph nodes were incorrectly diagnosed as metastatic rectal cancer 40% of the time. Part of the difficulty to diagnose in some instances is the lack of specific features at the histologic level that may point to prostate cancer, such as the presence of acinar or microacinar architectural patterns among others [18]. For this reason there are an increasing number of immunohistochemical markers to help discern between the two types of tissue including PSMAA and P501A [19]. It is important to be aware of this rare occurrence since treatment algorithms differ based on lymph node involvement.

#### PROSPECTIVE EVALUATION OF GRADING OF MESORECTAL SPECIMENS BY SURGEONS AND PATHOLOGISTS.

P50

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**Purpose/Background:** One of the key quality measures for rectal cancer surgery is the grading of the intactness of the mesorectal envelope. Although primarily a surgical measure, it does require coordination with pathology for adequate evaluation. In order to improve the mesorectal grading at our institution, our aim was to prospectively analyze the grading and agreement of surgeons and pathologists.

**Methods/Interventions:** We prospectively evaluated all consecutive rectal cancer surgery specimens from a group of seven colorectal surgeons. Mesorectal intactness was graded by the surgeon independently from the pathologists. The extent of agreement was then determined using Cohen's kappa.

**Results/Outcome(s):** There were 17 surgeries for rectal cancer performed over a five month period. Pathology determined that six (35.3%) were unable to be analyzed due to processing errors. For comparison, from 2008-2012 at our institution, 48% of rectal cancer specimens were deemed unable to evaluate. This left 11 surgeries (mean age 57.8 years, range 38-88) available for comparison of surgeon and pathologist ratings (four anterior resections, seven abdominoperineal resections). The average distance from the anal verge was 6.5 cm (range 0-13 cm). Surgeons

graded specimens as complete (four), partially complete (five) and incomplete (two). The value for kappa was 45.0%, which is indicative of moderate agreement between the surgeons and the pathologists.

**Conclusions/Discussion:** There was a moderate level of agreement between surgeons and pathologists in specimen grading. Our prospective evaluation of mesorectal intactness identified systemic errors that led to many specimens not being graded and highlights the importance of a multidisciplinary approach for rectal cancer reporting.

#### A "BLACK ESOPHAGUS" AS RESULT FORM THE DELAYED DIAGNOSIS OF A LARGE PRESACRAL MASS: CASE REPORT OF A RARE COMPLICATION.

P51

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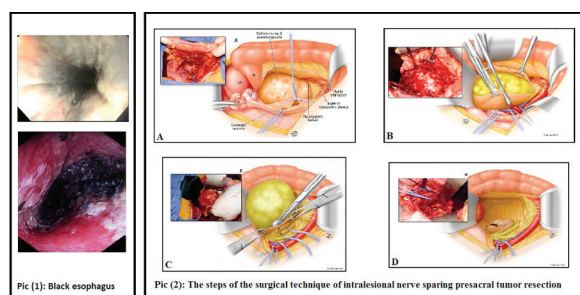
**Purpose/Background:** A "black esophagus" is a rare condition presented by critical ill patients and characterized by a darkened esophagus, in upper digestive endoscopy. This case presentation involves a 57 year old male who suffered multiple adverse sequelae from the delayed diagnosis of a large presacral mass. He initially presented with left leg swelling and was diagnosed and treated for a lower extremity deep venous thrombosis (DVT). Several months later he had progression of his DVT and developed a pulmonary embolus (PE). Due to his complaints of sharp right groin pain, imaging was obtained that demonstrated a 13X14 cm presacral pelvic mass almost completely filling the pelvis. The presacral mass occluded the right sided venous return from the leg and caused the DVT and PE. Due to the extensive lower extremity thrombosis and PE that patient had an inferior vena cava filter that was placed and eventually clotted. He then was referred to our institution for surgical consultation.

**Methods/Interventions:** There were several surgical questions that were raised prior to operating. The following issues were raised: What is the risk of surgical intervention for resection of the pelvic mass given his extensive clot burden? Is the patient a candidate for thrombolytics? Should the mass be removed prior to lytic therapy? Is a preoperative biopsy needed? What would the surgical approach be – intraliesional, marginal (<2 cm), or wide margin (>2 cm)?

**Results/Outcome(s):** The patient did receive lytic therapy prior to surgical resection of his pelvic mass and unfortunately developed hematemesis and a significant hemoglobin drop. An esophagogastroduodenoscopy (EGD) showed a proximal "black esophagus", pic (1). A transthoracic echocardiogram (TTE) showed a patent foramen ovale. The patient eventually stabilized and a repeat EGD a week later showed resolution of the ischemic esophagus. The patient later underwent a resection of the

pelvic mass after confirmation was made that the pelvic veins were patent, pic (2).

**Conclusions/Discussion:** The surgical approach and the surgical decision making will be discussed



### SURGICAL SITE INFECTION FOLLOWING SINGLE INCISION MINIMALLY INVASIVE COLORECTAL SURGERY. ANALYSIS IN LARGE COHORT OF CONSECUTIVE CASES.

P52

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**Purpose/Background:** Surgical site infection (SSI) is a leading cause of postoperative morbidity compromising the course of recovery. Although SSI occur more frequently following colorectal procedures, it has been shown that minimally invasive surgery (MIS) significantly **reduces** its incidence. We propose that single incision laparoscopic surgery (SILS) in which a single-port is placed at the initiation of the procedure facilitating multiple ports to be utilized in that single site, is associated with potentially lower risk of SSI. We identify the incidence in a large cohort of patients and present risk factors and outcomes.

**Methods/Interventions:** A total of 791 patients undergoing a colorectal procedure using SILS technique were analyzed. SILS was defined as the use of a single port through which all laparoscopic devices were placed. In some cases, SILS+1 technique was employed in which an additional 5 mm port was utilized for the laparoscope. Patients were divided into two groups according to the presence (SSI group [n = 41]) or absence, (non-SSI group [n = 750]) of an SSI. Peri-operative variables were compared between the 2 groups to identify factors associated with SSI.

**Results/Outcome(s):** Forty one patients out of 791 SILS colorectal surgery patients were identified, with an SSI incidence rate of 5.2%. Patient demographics (average age, BMI, and gender) were comparable between SSI and non-SSI groups. There was no significant difference between the 2 groups in terms of body mass index (BMI) class, age >65 years, a history of previous abdominal surgery, or the underlying pathologic condition. Regarding the intra-operative variables, no statistically

significant difference was observed for American Society of Anesthesiologists (ASA) score, surgical approach (SILS, SILS+1), operation time, excess blood loss, and need to transfusion. However, the creation of a stoma was significantly associated with SSI (26.8% in SSI group vs. 11.3% in non-SSI group,  $p=0.003$ ). Patients with SSI experienced longer hospital stay ( $7.8\pm 8.1$  days vs.  $3.7\pm 2.8$  days,  $p<0.0001$ ), 30-day readmission postoperatively ( $36.6\%$  vs.  $3.2\% \pm$ ,  $p<0.0001$ ), and 30-day unplanned reoperation ( $26.8\%$  vs.  $0.9\%$ ,  $p<0.0001$ ). LOS had a significantly direct correlation with age ( $r=0.094$ ,  $p<0.0001$ ) and operation time ( $r=0.2$ ,  $p<0.0001$ ).

**Conclusions/Discussion:** Although SSI is associated with higher morbidity, longer LOS, and increased chance of reoperation, it has a low incidence after MIS colorectal surgery using SILS technique. We theorize that the utilization of a wound protector as part of the SILS device at the initiation of the surgery as well as limiting the number of port sites plays a key role in these findings. Further studies are warranted to further investigate the merits of this procedure.

### IS SEGMENTAL COLECTOMY AN APPROPRIATE OPERATION IN COLONIC CROHN'S DISEASE?

P53

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**Purpose/Background:** The operation of choice for colonic Crohn's disease can be the subject of debate. Segmental colectomy can be associated with better function but may be associated with higher disease recurrence. We aim to assess the efficacy of segmental colectomy in colonic Crohn's disease.

**Methods/Interventions:** Patients who underwent surgical management of colonic Crohn's disease at St. Mark's hospital from 1997 to 2007 were analysed retrospectively. Patients who had segmental colectomy (SC) were compared with those who had total colectomy (TC). Reoperation for recurrent disease was the primary outcome.

**Results/Outcome(s):** Seventy three patients (male-42%, median age - 42; range 18 to 70), had surgery for colonic Crohn's disease. Fifty three patients had TC and 20 had SC. Mean follow up was 6 years. Of the 53 TC, 21 (39%) had an ileorectal anastomosis (IRA) while the rest had permanent stomas. Anastomotic stricture following IRA was higher than after SC (SC - 7% vs IRA - 14%;  $P=1$ ). A second surgery and anti TNF were both required in 20% of the SC group and 19% of the TC group ( $P>0.05$ ). Recurrence of disease in the small bowel was seen in 24.5% ( $n=13$ ) of the TC group versus 10% ( $n=2$ ) in SC group. Achieving bowel continuity was higher following segmental resections (65% vs 38%;  $P=0.06$ ). Individual

variable analysis failed to identify any risk factors associated with the recurrence pattern in this cohort.

**Conclusions/Discussion:** SC can be offered in suitable patients with colonic Crohn's disease as it offers a higher rate of achieving bowel continuity and a similar rate of reoperation when compared with TC.

### LAPAROSCOPIC ILEOCOLIC AND COLORECTAL RESECTIONS IN PATIENTS WITH CROHN'S DISEASE RESULTS IN LOWER RATE OF COMPLICATIONS WHEN COMPARED TO THE OPEN APPROACH: A NSQIP ANALYSIS.

P54

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**Purpose/Background:** The objective of the study was to compare postoperative major and minor complications of laparoscopic versus open ileocolic and colorectal resections in patients with Crohn's disease using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database.

**Methods/Interventions:** The ACS-NSQIP Participant Use Data Files from 2005-2013 were used to identify all patients with Crohn's disease that underwent open or laparoscopic ileocectomy, partial colectomy, proctectomy or proctocolectomy. Minor complications included superficial surgical site infection and urinary tract infection. Major complications included deep organ space infection, cardiac events, acute respiratory failure, pneumonia, venous thromboembolism, re-operation, renal failure and sepsis. Binomial logistic regression was performed to evaluate minor and major complications following the open and laparoscopic approach, while adjusting for preoperative risk factors such as emergency surgery, chronic steroid use, tobacco use, body mass index  $\geq 30$  kg/m<sup>2</sup>, American Society of Anesthesiology (ASA) score, and malnutrition defined as albumin  $< 3$  mg/dL.

**Results/Outcome(s):** A total of 5,490 patients were identified of which 3,238 (59%) patients underwent open resection while 2,252 (41%) underwent a laparoscopic operation. In the open group, 309 (11%) patients experienced minor complications as compared to 153 (7.4%) patients in the laparoscopic group (OR 0.64; 95% CI 0.52-0.79;  $p < 0.001$ ). There were 742 (22.9%) patients in the open group versus 324 (14.4%) patients in the laparoscopic group that experienced major complications (OR 0.57; 95% CI 0.49-0.65;  $p < 0.001$ ). After adjusting for preoperative risk factors, the odds of experiencing minor and major complications were significantly fewer with laparoscopic than with open surgery (OR 0.69; 95% CI 0.54-0.88;  $p = .003$  and OR 0.68; 95% CI 0.57-0.81;  $p < 0.001$ , respectively). Of the six risk factors, tobacco use and obesity were significantly associated with minor complications, whereas chronic steroid use, obesity, ASA

class  $\geq 3$  and malnutrition were significantly associated with major complications

**Conclusions/Discussion:** Among patients with Crohn's disease, laparoscopic ileocolic and colorectal resections significantly decrease both major and minor postoperative complications when compared with open surgery.

### OUTCOMES FOLLOWING TOTAL PROCTOCOLECTOMY FOR CROHN'S COLITIS IN THE BIOLOGIC ERA.

P55

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**Purpose/Background:** For patients with Crohn's colitis, total proctocolectomy and end ileostomy (TPC) may offer a favorable alternative to segmental or subtotal colectomy due to the decreased disease recurrence and need for reoperation. Prior to the biologic era, recurrence of Crohn's disease (CD) following TPC was upward of 39% with as many as 18% requiring reoperation within a decade. To date, no study has reexamined recurrence in the era of biologic therapy. We sought to determine 1) the 30-day post-operative morbidity and readmission rate following TPC, and 2) medical and surgical recurrence of CD.

**Methods/Interventions:** A retrospective chart review of all patients with Crohn's colitis who underwent completion or TPC between 2003-2016 was conducted. The primary endpoint was clinical recurrence of CD following TPC. Secondary endpoints included time to recurrence, risk factors associated with recurrence, and rate of reoperation for small bowel CD.

**Results/Outcome(s):** 148 patients were identified with a median follow-up of 14 months. The median age was 47 years and the median duration from diagnosis to TPC was 13 years. Prior to TPC, 18% of patients had at least one small bowel resection. Prior to surgery, 46% of patients were on steroids, 35% on immunomodulators, 51% on anti-TNF inhibitors, 9% on vedolizumab, and 1% on ustekinumab. At the time of surgery, 53% had perianal disease. Post-operatively, 17% patients developed superficial surgical site infections, 8% had deep/organ space infections, 15% required re-operation, 9% became dehydrated, and 1 person died. The 30-day readmission rate was 11%. In patients with at least 6 months of follow-up data, 86% did not receive anti-Crohn's prophylaxis, 2% were on methotrexate, 8% on azathioprine, 3% on 6-mercaptopurine, 15% on anti-TNF therapy and 1% on vedolizumab. 13% patients developed small bowel CD after a median of 17 months (IQR 11-35). No patients developed recurrent perineal disease but 26% with recurrence required an operation for small bowel disease. Smoking, prior small bowel surgery, perianal disease, and post-op prophylaxis with immunomodulators were not associated with recurrence.

On multivariable analysis, age less than 30 (OR 10.0; 95% CI 2.7-36.8) and post-operative prophylaxis with biologics (OR 4.1; 95% CI 1.1-15.7) were associated with an increased risk of disease recurrence.

**Conclusions/Discussion:** Following TPC for Crohn's colitis, 13% of patients developed recurrence of CD in the small bowel, and a quarter of these patients required a subsequent operation. This data suggests a marked reduction in disease recurrence since the introduction of biologic therapy. However, young patients appear to be at increased risk of recurrence. Similarly, patients on biologics were at increased risk (likely reflecting clinical concern for recurrence). Further investigation should be performed to determine the optimal timing and treatment algorithm for prevention of post-TPC disease recurrence.

#### OUTCOMES OF ILEOCOLIC RESECTION VERSUS ILEOCOLIC RESECTION WITH A CONCOMITANT PROCEDURE IN PATIENTS WITH CROHN'S DISEASE: WHAT IS THE ADDED RISK?

P56

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**Purpose/Background:** This study aimed to compare outcomes of ileocolic resection (ICR) and ICR with a concomitant procedure for patients with Crohn's disease (CD).

**Methods/Interventions:** After institutional review board approval, a cohort study using the American College of Surgeons National Surgical Quality Improvement Program database for patients with Crohn's Disease who underwent ileocolic resections or ileocolic resections with a concomitant procedure between 2005-2015 was performed. Concomitant procedures were defined as any interventions on bowel related to Crohn's disease. Preoperative characteristics, comorbidities, laboratory results, procedure characteristics, post-operative outcomes, infectious complications (including post-operative leak and sepsis, 30-day morbidity and mortality) were compared using univariate and multivariate analyses.

**Results/Outcome(s):** Of 6,204 patients who met the inclusion criteria, 5692 (91.75%) and 512 (8.25%) underwent ICR and ICR with a concomitant procedure, respectively. Most common concomitant procedures were single resection and anastomosis of small intestine (48.0%), stricturoplasty (24.0%), partial colonic resection (20.3%) and closure of intestinal-cutaneous fistula (10.9%). Mean age of the entire cohort was 40.2 years ( $\pm 15.3$ ); 45.9% were male and 49.9% were immunosuppressed. On univariate analysis comparing ICR and ICR with a concomitant procedure, 45.0% vs. 55.5% were male ( $p < 0.001$ ) and 52.3% vs. 20.5% were performed laparoscopically

( $p < 0.001$ ). On univariate analysis, patients who underwent ICR with concomitant procedure had a higher rate of surgical site infections (SSI) (18.2% vs. 12.3%,  $p = 0.0003$ ), organ space infections (10.7% vs. 5.8%,  $p < 0.001$ ), infectious complications (20.7% vs. 16.2%,  $p = 0.011$ ), sepsis/septic shock (9.0% vs. 6.1%,  $p = 0.014$ ). After adjusting for sex, body mass index, hypertension, laparoscopic stoma, albumin, smoking, wound classification, diabetes and immunosuppression, on multivariate analysis, an ICR with concomitant procedure was a significant predictor of organ space SSI [OR 1.7, 95%CI (1.22, 2.40)] and re-operation [OR 3.5, 95%CI (1.15, 11.0)]. Length of stay for patients with ICR with concomitant procedures was increased by 10% [IRR 1.11, 95%CI (1.04-1.18)]. Both groups had comparable risks of anastomotic leak, sepsis, infectious complications, major morbidity and mortality. Low preoperative albumin, dirty wound classification, immunosuppression, and smoking were found to be predictors of infectious complications, morbidity, and mortality in both groups.

**Conclusions/Discussion:** To our knowledge, this is the largest study that describes the added impact of a concomitant procedure when an ICR is performed for CD. A concomitant procedure increases the likelihood of organ space SSI, need for re-operation, and prolonged hospitalization.

#### CHRONIC STEROID USE IN COLORECTAL CANCER PATIENTS WORSENS POSTOPERATIVE MORBIDITY AND MORTALITY THROUGH SEPTIC COMPLICATIONS IN A PROPENSITY-MATCHED ANALYSIS.

P57

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**Purpose/Background:** Rates of comorbid patients undergoing surgical resection for colorectal cancer are steadily increasing. Additionally, numbers of patients on chronic immunomodulators and steroids are steadily increasing. Chronic steroid use has been associated with worsened outcomes following surgical intervention. However, the role of chronic steroid use on specific post-operative complications in colorectal cancer patients remains unanswered. Here, we hypothesized that chronic steroids were associated with worsened operative outcomes across multiple types of systemic complications.

**Methods/Interventions:** Patients with post-operative diagnosis of colon or rectal cancer from 2005-2012 were assessed using the American College of Surgeons National Surgical Quality Improvement Program dataset. Propensity-score matching accounted for demographics, comorbidities, case complexity, and operative time. The chronic steroid and non-steroid cohorts were compared

to assess primary outcomes of 30-day mortality and 30-day overall morbidity. Secondary endpoints included length of stay and system-specific complications.

**Results/Outcome(s):** During the study period, 50,766 patients were identified with 1203 (2.4%) taking steroids longer than 30 days prior to surgery. After propensity matching, 1197 patients in each cohort were evaluated with no differences seen in age, BMI, male sex, work relative value units (RVU), wound classification, emergency case status, presence of preoperative sepsis or operative time. Rates of vascular, cardiac, pulmonary, neurologic, hepatic, renal and diabetic comorbidity were not different between the groups. On outcome analysis, 30-day mortality (5.7% vs 3.4%,  $p < 0.001$ ) and 30-day overall morbidity (35.4% vs 29.0%,  $p=0.001$ ) were significantly higher in patients on chronic steroids. Septic complications (10.6% vs 7.9%,  $p=0.02$ ) and surgical site infections (15.3% vs 12.3%,  $p=0.03$ ) were significantly elevated in chronic steroid patients. However, there were no differences in cardiovascular, pulmonary, renal, or neurological complications between groups. Chronic steroid patients demonstrated longer total hospital stay ( $11.4 \pm 11.7$  vs  $9.5 \pm 9.4$  days,  $p < 0.001$ ) and post-operative length of stay ( $9.4 \pm 9.2$  vs  $8.1 \pm 7.6$  days,  $p < 0.001$ ).

**Conclusions/Discussion:** Rates of colorectal resection for cancer continue to rise, as do rates of patient comorbidity. As numbers of chronic conditions involving treatment with steroids increase, surgeons must understand patient risk profile to provide adequate pre-operative counseling. Here, we show that steroid use is associated with worsened sepsis and infectious complications without contributing to organ-specific complications. Future study is required to determine pathways and therapies by which this risk may be reduced.

**Methods/Interventions:** From November 2015 to March 2016, 57 elective colorectal resections performed according to our ERAS protocol were compared to a propensity-matched group prior to implementation of the protocol. All patients prior to protocol implementation received opioid patient controlled analgesia (PCA) post-operatively. All ERAS patients received multimodal pain therapy with acetaminophen, gabapentin, and ketorolac, alone or in addition to a TAP Block. Patient baseline characteristics, opioid requirements, average and daily pain scores by visual analog scale (VAS), and failure of pain management (requirement for opioid patient-controlled analgesia (PCA)) were recorded and compared between groups.

**Results/Outcome(s):** There were no differences in patient characteristics, procedure type, operative approach or preoperative opioid use between groups. Introduction of the ERAS protocol resulted in significantly decreased opioid requirements through postoperative day 2 ( $p < 0.0001$ ), while daily and average pain scores did not differ significantly between groups. Within the 57 ERAS protocol patients, 20 patients were managed with multimodal pain therapy alone, 26 patients received a TAP block preoperatively and 11 patients received a TAP block post-operatively. When compared to multimodal pain management alone, TAP blocks performed preoperatively were associated with significantly decreased opioid use through postoperative day 2 ( $p=0.0322$ ), and fewer patients in the preoperative TAP block group required rescue with opioid patient-controlled analgesia (PCA) ( $p=0.0460$ ).

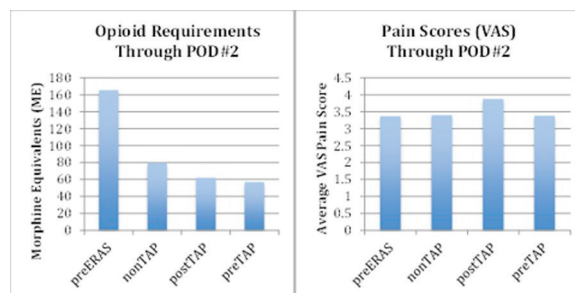
**Conclusions/Discussion:** Inclusion of preoperative TAP blocks in our ERAS protocol decreased opioid requirements compared to multimodal pain management alone. For maximum benefit, TAP blocks should be performed preoperatively.

**PREOPERATIVE TRANSVERSUS ABDOMINIS PLANE BLOCK DECREASES OPIOID REQUIREMENTS WITHIN AN ENHANCED RECOVERY AFTER SURGERY PROTOCOL.**

P58

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**Purpose/Background:** Enhanced Recovery After Surgery (ERAS) protocols have been often described in the field of Colorectal Surgery, with demonstrated benefits in length of stay, bowel function, and complication rates. By optimizing pain management and limiting opioid-associated bowel inhibition, multimodal pain management is a key component of these protocols. We evaluated the use of transversus abdominis plane (TAP) blocks as part of a multimodal pain management strategy within our newly implemented ERAS protocol.





## ILEOSTOMY FORMATION IS ASSOCIATED WITH COMMUNITY-ACQUIRED ACUTE KIDNEY INJURY AND NEW ONSET CHRONIC KIDNEY DISEASE.

P59

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**Purpose/Background:** Ileostomy formation results in loss of colonic absorptive capacity and may lead to dehydration; however, associations with acute kidney injury (AKI) and chronic kidney disease (CKD) are uncertain. The purpose of this study was to quantify the relationships between new ileostomy formation and community-acquired AKI and new onset CKD.

**Methods/Interventions:** A retrospective review of administrative data was performed to identify patients who underwent ileostomy formation with or without bowel resection (ileostomy group) or bowel resection without ileostomy formation (reference group) between May 1, 2002 and Jan 1, 2015 in Alberta, Canada. Linked laboratory data was used to ascertain community-acquired AKI within 3 months following discharge from hospital and new CKD within 1 year following discharge from hospital. Community-acquired AKI was defined as an outpatient (or within 1 day of readmission) increase in serum creatinine (sCr) to at least 1.5 times the postoperative baseline (defined as the last inpatient sCr measurement prior to discharge). AKI was further categorized into stages of severity based on sCr increases of 1.5 to 2.0 times baseline for stage 1 AKI, >2 to 3 times baseline for stage 2 AKI, and >3 times baseline for stage 3 AKI. New onset CKD was defined as a  $\geq 3$ -month period with a mean estimated glomerular filtration rate (eGFR) of  $< 60$  ml/min/1.73m<sup>2</sup> in a patient with a preoperative and in-hospital postoperative baseline eGFR of  $> 60$  ml/min/1.73m<sup>2</sup>. Associations between ileostomy formation and community-acquired AKI and new CKD were determined using logistic regression models adjusted for age, sex, admission urgency, baseline eGFR, inpatient postoperative AKI, and individual Charlson comorbidities.

**Results/Outcome(s):** We identified 20,495 patients, of whom 4283 comprised the ileostomy group and 16,212 comprised the reference group. Community-acquired AKI was noted among 15.1% (646/4283) of the ileostomy group compared to 4.6% (743/16,212) of the reference group. The adjusted odds ratio (OR) for community-acquired AKI for the ileostomy group was 4.10 (95%CI=3.65-4.62) for AKI of any stage, 7.11 (95%CI=5.68-8.90) for AKI of stage 2 or greater, and 8.11 (95%CI=5.33-12.33) for AKI stage 3. New onset CKD was noted among 6.4% (224/3502) of at risk patients (without preexisting CKD) in the ileostomy group compared to 2.0% (250/12,711) of at risk patients in the reference group. The adjusted OR for new onset CKD for the ileostomy group was 4.91 (95%CI=4.02-5.99).

**Conclusions/Discussion:** Ileostomy formation is strongly associated with community-acquired AKI and new onset CKD. Surgeons should be vigilant for kidney disease following ileostomy construction. Future studies should focus on developing and evaluating strategies for the prevention, early identification, and treatment of this complication.

## EARLY AND LATE LEAKAGES AFTER ANTERIOR RESECTION SEPARATE ENTITIES.

P60

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**Purpose/Background:** Anastomotic leakage (AL) is the main complication after anterior resection (AR) for rectal cancer with frequencies from 3-27 %. Many studies have addressed risk factors and early detection of AL, however the long term clinical outcomes of AL including late presenting leakages (LL) are less commonly reported. This study was undertaken to assess the clinical features of LL regarding incidence, association to predisposing factors of AL and need for reintervention.

**Methods/Interventions:** The Swedish Colorectal Cancer Registry (SCRCR) was retrospectively explored for cases of AL after AR for rectal cancer among patients operated on in southern Sweden from January 1<sup>st</sup> 2001 to December 31<sup>st</sup> 2011. Demographic data, technical details of the surgical procedure, number of postoperative days (POD) until diagnosis of AL, data regarding presenting symptoms and methods of diagnosing AL were retrieved from medical records. *Definition of AL:* AL was defined as a visible anastomotic defect found during endoscopy, leakage of rectal contrast evaluated by plain radiography or CT, a postoperative pelvic abscess, a palpable dehiscence on digital examination, a postoperative rectovaginal fistula on gynecological examination as well as postoperative vaginal discharge of gas, pus or faeces, findings of AL during laparotomy in the form of pus or faeces in the pelvis or an obvious anastomotic dehiscence on relaparotomy. *Definition of LL:* Diagnosis of AL made after hospital discharge.

**Results/Outcome(s):** 1442 patients operated on with AR were identified through SCRCR and 144 cases were classified with AL (10 %). Two AL patients did not give consent to data retrieval from medical records, in three AL cases medical records were not to be found. Median time from operation to reporting data was 87 months (range 21-162). Early leakages (EL) were detected in 51% (n 71). LL in 49% (n 68). EL and LL were diagnosed on median POD 8 (range 8-2059) and 29 (range 8-2059) respectively. LL was significantly related to neoadjuvant radiotherapy ( $p < 0.001$ ) and in women, 51% of LL presented as a rectovaginal fistula. EL was significantly related to male gender ( $p 0.01$ ), lack of a defunctioning stoma at index

operation (p 0.002) and a need for relaparotomy after diagnosis (p 0.001).

**Conclusions/Discussion:** LL after AR is a common feature and constitutes half of all ALs after AR for rectal cancer in this study. Our findings support that EL and LL should be regarded as a separate clinical entities. The large proportion of LL among AL cases calls for close follow up in the outpatient setting.

**LENGTH OF STAY FOLLOWING IMPLEMENTATION OF ENHANCED RECOVERY AFTER SURGERY: A PROPENSITY MATCHED ANALYSIS.**

P61

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**Purpose/Background:** Enhanced Recovery after Surgery (ERAS) protocols have been increasingly implemented worldwide; resulting in widely reported improvements in length of stay, complication rates and time to return of bowel function. We sought to determine the early effects of ERAS implementation at our institution, and to identify areas for improvement within our existing protocol.

**Methods/Interventions:** From November 2015 to March 2016, 57 elective colorectal resections performed according to our ERAS protocol were compared to a propensity-matched group prior to ERAS implementation. The protocol was based on ERAS Society recommendations, and included components of preoperative counseling, avoidance of prolonged fasting, nutrition optimization with carbohydrate loading, goal-directed fluid therapy, multimodal pain management, and early oral nutrition and ambulation following surgery. Length of stay was stratified according to day of discharge, and was compared between ERAS and pre-protocol patients within subgroups according to demographic and operative factors. Univariate regression analysis was performed to identify patient factors, protocol elements and postoperative outcomes associated with an extended length of stay.

**Results/Outcome(s):** There were no differences in age, sex, preoperative co-morbidities, procedure type, operative approach, procedure time, or average operative blood loss between groups. Total opioid requirements (p=0.0022), Net fluid balance (p=0.0172) and time to return of bowel function (p=0.0001) were all significantly decreased in the ERAS group compared to traditional management. Median (4 days vs 5 days) and mean (5.54 days vs 7.72 days) length of stay were significantly reduced following protocol implementation (p=0.0152) and patients managed according to the ERAS protocol had more early discharges (64.91% vs 33.33% with LOS < 4 days), and less extended admissions (10.52% vs 22.81% with LOS > 10 days). In subgroup analysis, the ERAS protocol resulted in decreased length of stay for all patients

	All AR n 1298	All AL n 139	EL n 71	LL n 68	P
POD to AL diagnosis, days median (range)		15 (2-2059)	8 (2-27)	29 (8-2059)	
Age at operation, years median (range)	67 (32-93)	66 (37-87)	69 (38-88)	64 (40-85)	0.08 <sup>1</sup>
Male gender, percent (number)	54 % (n 705)	62 % (n 86)	72 % (n 51)	51 % (n 35)	0.01 <sup>2</sup>
Neoadjuvant radiotherapy, percent (number)	51 % (n 666)	63 % (n 87)	48 % (n 34)	78 % (n 53)	<0.001 <sup>2</sup>
Tumor level, cm from anal verge **					0.003 <sup>2</sup>
• 0-5	2 % (n 27)	6 % (n 8)	8 % (n 6)	3 % (n 2)	
• 6-10	49 % (n 627)	57 % (n 79)	46 % (n 33)	67 % (n 46)	
• 11-15	49 % (n 615)	37 % (n 51)	45 % (n 32)	28 % (n 19)	
Defunctioning loop ileostomy at index operation, percent (number)	56 % (n 723)	54 % (n 75)	39 % (n 28)	69 % (n 47)	0.002 <sup>2</sup>
pT Category, percent (number)***					0.72 <sup>2</sup>
• T0-T2	35 % (n 375)	33 % (n 37)	30 % (n17)	36 % (n 20)	
• T3	54 % (n 582)	59 % (n 66)	61 % (n 34)	57 % (n 32)	
• T4	5 % (n 60)	4 % (n 5)	7 % (n 4)	2 % (n 1)	
• TX	6 % (n 69)	4 % (n 4)	2 % (n 1)	5 % (n 3)	
pN Category, percent (number)***					0.07 <sup>2</sup>
• N0	51 % (n 557)	54 % (n 61)	46 % (n 26)	62 % (n 35)	
• N1	24 % (n 264)	25 % (n 28)	27 % (n 15)	23 % (n 13)	
• N2	15 % (n 160)	18 % (n 20)	25 % (n 14)	11 % (n 6)	
• Nx	10 % (n 105)	3 % (n 3)	2 % (n 1)	4 % (n 2)	
ISREC Classification#					0.001 <sup>2</sup>
• A. No treatment		6 % (n 9)	1 % (n 1)	12 % (n 8)	
• B. Treatment without laparotomy		43 % (n 60)	34 % (n 24)	53 % (n 36)	
• C. Laparotomy		50 % (n 70)	65 % (n 46)	35 % (n 24)	

<sup>1</sup> Kruskal-Wallis Test  
<sup>2</sup> Chi-Square Test  
<sup>3</sup> Missing data: n 29 in All AR; n 1 in All AL and LL  
<sup>4</sup> Data available from 2003-01-01, 1200 patients in total  
# ISREC Classification: A validated definition and grading system of AL after AR proposed from the International Study Group of Rectal Cancer, facilitating comparison between studies.

**P61 ERAS Protocol - Univariate Predictors of LOS>7 Days**

	Odds Ratio	Confidence Interval (CI)	p-value
Low Anterior Resection (LAR)	4.60	1.18 - 18.12	0.0279
Postoperative Ileus	7.17	1.04 - 49.28	0.0453
Failure of Multimodal Pain Therapy	6.99	1.30 - 37.43	0.0230
Acute Kidney Injury (KDIGO Criteria)	3.29	1.02 - 33.35	0.0230

regardless of age, sex, BMI, ASA status, procedure type or operative approach. Using univariate regression analysis, factors associated with a length of stay > 7 days were low anterior resection (LAR) procedure ( $p=0.0450$ ), development of postoperative ileus ( $p=0.0490$ ) failure of multimodal pain therapy ( $p=0.0230$ ), and presence of acute kidney injury ( $p=0.045$ ). In secondary regression analysis, the development of postoperative ileus was found to be associated with increased total opioid requirements on the day after surgery ( $p=0.0179$ ) and the occurrence of postoperative acute kidney injury ( $p=0.0124$ ).

**Conclusions/Discussion:** Implementation of an ERAS protocol resulted in decreased length of stay for all patient and procedure types. Efforts to improve existing ERAS protocols should be focused on optimizing postoperative pain control and avoiding postoperative ileus and acute kidney injury.

#### OPERATIVE TIME AND LENGTH OF STAY IS SIMILAR BETWEEN ROBOTIC-ASSISTED AND LAPAROSCOPIC COLON AND RECTAL RESECTIONS.

P62

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**Purpose/Background:** Robotic-assisted surgery is increasingly being utilized for colorectal surgery. Data is scarce and contradictory when outcomes are compared between robotic and laparoscopic surgery. The purpose of this study is to examine length of stay (LOS) and operative time between the two techniques in patients that underwent a colon or rectal resection.

**Methods/Interventions:** All colon and rectal resections were compiled between 2009-2015. Patients that underwent an open procedure and multiple procedures were excluded from the analysis. When comparing characteristics between laparoscopic and robotic surgery, Fisher's exact test was used for categorical variables, and the unpaired t-test was used for continuous variables. The Mann-Whitney U test was used to compare LOS and operative time between the two surgery groups for both colon and rectal resections. SAS version 9.4 was used for all analyses, and a  $p$ -value < 0.05 was considered to be statistically significant.

**Results/Outcome(s):** After exclusions, 255 patients were identified for evaluation. There were 185 patients that underwent laparoscopic resection and 70 that underwent robotic resection. Age, race, gender, American Society of Anesthesiologists score and body mass index were similar between the two groups (all  $p > 0.05$ ). Two hundred thirty patients underwent colon resections and 25 underwent rectal resections. There was no statistical difference in median LOS days between laparoscopic and robotic colon (both 4 days;  $p=0.5$ ) and rectal (6 days vs 4.5 days;  $p=0.2$ ) resections. Median operative times were

also similar between the two approaches for colon 150.5 vs 169.5 minutes,  $p=0.2$ ) and rectal (197.0 vs 231.5 minutes,  $p=0.9$ ) resections. When length of stay for right and left colectomies was examined, right (median=4.0 vs 4.0 days;  $p=0.7$ ) and left (median=4.0 vs 4.5 days;  $p=0.5$ ) colectomies were similar for robotic and laparoscopic approaches. There was also no difference in operative time between the two approaches for right (median=137 vs 130.5 minutes;  $p=0.9$ ) and left (median=162.0 vs 170.5 minutes;  $p=0.6$ ) colectomies.

**Conclusions/Discussion:** Robotic surgery results in similar operative times and length of stay as laparoscopic surgery for patients undergoing colon and rectal resections. At this point in time, surgeon preference should dictate the approach used for minimally invasive colorectal surgery.

#### EFFECT OF DIAGNOSIS ON COLECTOMY OUTCOMES IN THE SETTING OF ENHANCED RECOVERY PROTOCOLS.

P63

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**Purpose/Background:** Implementation of Enhanced Recovery Protocols (ERP) in colectomy reduces length of stay (LOS) and morbidity, but it remains unknown whether benefits vary by pathology. Our objective was to compare the effect of ERP use on outcomes after colectomy for three diagnoses: 1) neoplasm, 2) diverticulitis and 3) inflammatory bowel disease (IBD).

**Methods/Interventions:** Novel ERP variables were released in NSQIP in July 2014. Patients with ERP variable data undergoing elective colectomy (July 2014-December 2015) for neoplasm ( $n=4620$  [66.5%]), diverticulitis ( $n=1730$  [24.9%]), and IBD ( $n=593$  [8.5%]) were included. The association of diagnosis with prolonged LOS, any surgical site infection (SSI), death or serious morbidity (DSM), unplanned reoperation, and readmission was evaluated using multivariable logistic regression with robust standard errors to account for outcomes clustered in hospitals while controlling for case and procedure mix and compliance with ERP. Kruskal-Wallis tests compared the number of days for patients to tolerate a diet, achieve pain control with oral medication, and have return of bowel function in each cohort.

**Results/Outcome(s):** There were no statistically significant differences in outcomes between patients with neoplasm and diverticulitis. Patients undergoing colectomy for IBD were more likely to have prolonged LOS (OR 2.32, 95%CI 1.74-3.08), DSM (OR 1.86, 95%CI 1.31-2.63), unplanned reoperation (OR 1.75, 95%CI 1.04-2.94) and readmission (OR 1.67, 95%CI 1.25-2.22) compared to patients with neoplasm. Patients with IBD took longer than patients with neoplasm or diverticulitis to tolerate a diet (mean 4.1 days vs. 3.7 and 3.5 days respectively,

$p < 0.001$ ) and to achieve PO pain control (mean 4.2 days vs. 3.4 and 3.5 days respectively,  $p < 0.001$ ).

**Conclusions/Discussion:** Outcomes following ERP implementation vary by diagnosis. Patients undergoing colectomy for neoplasm and diverticulitis have improved outcomes compared to patients undergoing colectomy for IBD. Knowledge of expected outcomes for patients with different diagnoses may inform clinician and patient expectations.

### ESTIMATED GLOMERULAR FILTRATION RATE IMPACTS ON COLORECTAL SURGERY OUTCOMES: A NATIONAL DATABASE ANALYSIS.

P64

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**Purpose/Background:** The effect of chronic kidney disease (CKD) on the outcomes of colorectal surgery is remained unknown. We sought to identify the impacts of estimated glomerular filtration rate (eGFR) on colectomy outcomes.

**Methods/Interventions:** The study population consisted of all colectomy cases in the American College of Surgeons National Surgical Quality Improvement Program colectomy targeted participant use data file from 2012 to 2014. Emergent cases, patients on current dialysis, disseminated cancer cases, and patients with preoperative wound infections were excluded from the study. Preoperative serum creatinine concentrations, age, sex, and race were used to calculate eGFR based on the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) formula. Patients were divided into five groups including patients with  $eGFR \geq 120$ , CKD I or normal ( $90 \leq eGFR < 120$ ), CKD II ( $60 \leq eGFR < 90$ ), CKD III a and b ( $30 \leq eGFR < 60$ ), and CKD IV or V ( $eGFR < 30$  mL/min/1.73m<sup>2</sup>). CKD I or Normal group was set as reference group. Multivariate logistic regression model was used to analyze the outcomes.

**Results/Outcome(s):** The cohort included 4283 patients. Of these 427 (10%) had  $eGFR \geq 120$ , 1685 (39.3%) were CKD I or normal, 1615 (37.7%) were CKD II, 500 (11.7%) were CKD III, and 56 (1.3%) were CKD IV or V. The median body mass index was 27.26, 27.61, 27.8, 28.6, and 29 for the groups as described above. The mean length of hospital stay (LOS) were  $7.32 \pm 8.34$  days in  $eGFR \geq 120$  group,  $7.54 \pm 7.89$  in CKD III group and  $9.27 \pm 8.22$  in CKD IV or V group, that were significantly longer than  $6.39 \pm 6.38$  in reference group ( $P < 0.05$ ). There was no significant difference in LOS between CKD II group ( $6.21 \pm 5.60$ ) and reference group. Following risk adjustment, no significant difference in in-hospital mortality rate or anastomotic leak was observed. However, serious morbidity rate was significantly higher in patients with  $eGFR \geq 120$ , CKD III,

and CKD IV or V groups compare to the reference group (18.5%, 20.4%, 41.1% vs. 13.4%, AOR: 1.63, 1.49, 3.39,  $P < 0.05$ , respectively). CKD II patients had lower serious morbidity rate compared to the reference group, but it was not significant (12.9% vs. 13.4%,  $P = 0.33$ ).

**Conclusions/Discussion:** As expected, our results of this study showed that decreased eGFR level ( $< 60$ ) significantly impacts morbidity rate and increases length of stay (LOS) in the hospital following elective colectomy. Interestingly, patients with very high eGFR ( $eGFR \geq 120$ ) also have significantly higher complications and longer LOS compared to the reference group. eGFR is well known to overestimate actual kidney function in patients with low muscle mass, which may explain the higher complication rate in patients with very high eGFR. eGFR may be considered as a useful parameter to predict the outcome of colorectal surgery in CKD patients.

### ACCURACY OF THE ACS NSQIP RISK CALCULATOR IN PREDICTING OUTCOMES FOR URGENT COLECTOMIES.

P65

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**Purpose/Background:** The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) risk calculator (RC) is a tool often used by surgeons to predict postoperative outcomes based on 19 patient specific preoperative risk factors including age, gender, several medical conditions, and acuity of the case. Operative acuity was defined as either emergent or elective, but starting in year 2012 a distinction was made between purely elective cases and cases that are neither elective nor emergent. This change is not accounted for in the RC. Our goal was to evaluate the accuracy of the RC in the urgent (non-elective/non-emergent) population at a single institution.

**Methods/Interventions:** A retrospective review of our hospital's NSQIP data from January 2012 to May 2016 for patients who underwent urgent colectomies, defined as patients admitted via the emergency department undergoing subsequent non-emergent surgery, was performed. This group of patients was input into the RC as elective and again as emergent. Predicted outcomes were then compared to actual outcomes in the urgent colectomy group. Statistical analysis included Wilcoxon rank tests, logistic regression, and ROC curves.

**Results/Outcome(s):** There were 301 patients included in the study, representing 19% of all colectomies. The mean age was 67 years and 56% had an American Society of Anesthesiologists score of 3. In patients who actually had complications, the mean risk of having any complication was  $35 \pm 14\%$  when input into the RC as elective and  $40 \pm 14\%$  when input as emergent. In patients without

postoperative issues, the risk of having no complications was  $25\pm 11\%$  and  $28\pm 11\%$  ( $p < 0.0001$ ), respectively. However, the predictive probability was 0.74 for both groups based on the ROC curve. The median predicted risk of discharge to a nursing/rehab facility was 35% (elective) and 43% (emergent) in the 92 patients with this outcome, versus 10% and 14% in those without ( $p < 0.0001$ ). The median predicted risk of death was 9% (elective) and 14% (emergent) in the 16 patients who died, versus 2% and 3% in those who did not ( $p < 0.0001$ ). The predictive probability of death was 0.85 in both groups. Overall, of the 15 outcomes accounted for by the RC, 2 showed higher predictive value, 6 did not show notable predictive value, and the remainder lacked appropriate statistical power to draw conclusions.

**Conclusions/Discussion:** Discussing postoperative morbidity and mortality is important to the informed consent and decision-making process for patients and families. In utilizing the ACS NSQIP RC to estimate outcomes for these dialogues, we found while it was able to predict mortality and discharge to a nursing/rehab facility, no evidence was found to suggest it accurately predicts complications for urgent colectomy cases. Consequently, we do not feel confident the current RC is accurate in predicting complications for urgent colectomies and recommend accounting for this acuity of patients in the future.

## ENHANCED RECOVERY AFTER SURGERY: AN IMPLEMENTATION STRATEGY FOR MULTIPLE HOSPITALS AND SURGICAL SPECIALTIES.

P66

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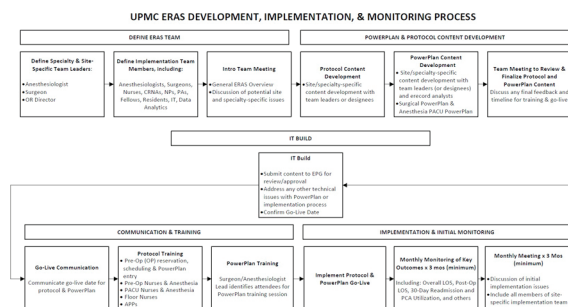
**Purpose/Background:** Enhanced Recovery After Surgery (ERAS) guidelines were originally developed for colorectal surgery (CRS) patients but have recently been applied to other surgical specialties with positive patient outcomes. Despite evidence supporting their use, ERAS protocols have had poor adoption. We aimed to successfully implement an ERAS program across a large multi-hospital academic medical center at multiple hospitals and in several surgical specialties using a staged, multidisciplinary team (MDT) approach.

**Methods/Interventions:** The University of Pittsburgh Medical Center is comprised of more than 20 hospitals that utilize a single inpatient medical record. First, a MDT including surgeons, anesthesiologists, nurses and pharmacists was assembled. The MDT developed ERAS institutional protocols for CRS and pancreas surgery as well as developed a strategic launch plan, which included patient educational materials, a multiphase inpatient powerplan

within the electronic order entry system, patient monitoring capability, staff education, and an implementation timeline (Figure 1). Following implementation, debriefing sessions with the MDT were scheduled at regular intervals to report protocol compliance and outcomes. ERAS was first implemented within CRS and pancreas surgery at the main hospital, Hospital A. Next, hospital site-specific MDTs were assembled in coordination with a system-wide MDT. The implementation process was sequentially repeated at Hospital B for CRS, Hospital C for CRS and pancreas surgery and other abdominal surgical oncology. Finally, ERAS protocols were implemented at Hospital D for both gynecologic oncology and minimally invasive gynecologic surgery (MIGS). With the addition of surgical specialties, the MDT developed ERAS protocols tailored to specific surgery subtypes.

**Results/Outcome(s):** Strategic implantation of ERAS protocols across multiple hospitals was deployed in a sequential and iterative process using an implementation timeline with targets and deadlines. Regular interval audits of protocol compliance were performed and feedback was provided. Implementation of a colorectal ERAS protocol at Hospital A reduced median length of stay (LOS) from 7 to 4 days. Similarly, LOS was reduced from 6 to 4 days for CRS at Hospital B, from 6 to 4 days for CRS and surgical oncology at Hospital C. Pancreas surgery patients had a similar reduction in LOS from 8 to 6 days. Early data following implementation within gynecologic oncology demonstrates reduced LOS from 4 to 3 days. Finally, MIGS discharged 72 of 95 patients from the PACU after undergoing hysterectomy.

**Conclusions/Discussion:** A strategic implementation timeline utilizing both a system-wide and site-specific MDT is an effective approach to implementation of an ERAS program across multiple hospitals and services. Additional audits of protocol compliance may allow for further improvement in patient outcomes.



**PROSPECTIVE STUDY OF THE FEASIBILITY AND SAFETY OF THE IMMEDIATE USE OF A REGULAR DIET AFTER ELECTIVE COLORECTAL SURGERY.**

P67

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**Purpose/Background:** Offering patients a low residue diet on the first postoperative day (POD1) after colorectal surgery is safe and improves surgical outcomes and postoperative hospital stay. The aim of this study was to prospectively evaluate the feasibility and safety of offering a regular diet immediately after major colorectal surgery on POD 0.

**Methods/Interventions:** Over a 4-month period ending Oct 2016, consecutive patients undergoing major colorectal surgery were offered a regular diet immediately after arriving on the floor. Demographic and perioperative variables, tolerance of diet, postoperative complications, length of postoperative hospital stay and 30-day hospital readmission were prospectively tabulated. Complications were assessed using the Clavien-Dindo classification. Fisher's exact test and Mann-Whitney test were performed for categorical and continuous variables. A p value <0.05 was considered statistically significant.

**Results/Outcome(s):** The study cohort of 49 patients included 25 (51%) males and had a median age of 47 years (range, 19-88). Procedures were performed using a laparoscopic (n=25;51%) or open (n=24;49%) technique. Primary anastomosis was used in 32 (65%) patients. Only 20 (41%) patients consumed the ordered regular diet. The only significant preoperative and intraoperative feature which differed between patients who consumed an immediate regular diet versus those who did not wish to eat

was median body mass index (20.8 versus 23.3; p=0.004). Postoperative outcomes are shown in the Table.

**Conclusions/Discussion:** Immediate consumption of a regular diet was feasible in only 41% of patients after major colorectal surgery. However, patients willing to eat a regular diet immediately after surgery had a trend toward shorter postoperative hospital stay with no significant increase in postoperative complications. Consumption of regular diet on POD 0 may be the first predictor of shorter hospital stay after major colorectal surgery.

**EXTENDED VENOTHROMBOEMBOLISM PROPHYLAXIS AFTER COLORECTAL CANCER SURGERY IS NOT JUSTIFIED WITHOUT FURTHER RISK STRATIFICATION.**

P68

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**Purpose/Background:** Guidelines recommend extended venothromboembolism (VTE) prophylaxis for all patients following colorectal cancer surgery. Studies have demonstrated variable provider uptake of this practice due to cost and dissent from these existing guidelines. The purpose of this study was to identify thresholds using decision analysis for when such extended prophylaxis (ePpx) may be appropriate.

**Methods/Interventions:** All colorectal cancer patients undergoing primary tumor resection were identified within a private payer administrative database (MarketScan, Truven Health). Cases were stratified by the use of pharmacologic agents for VTE prophylaxis following discharge. Outcomes of interest were occurrence of a postoperative VTE event requiring hospital readmission, mortality, and

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Variable	Immediate Regular Diet		p
	Taken (n=20)	Not Taken (n=29)	
Time for first flatus	2 (0-5)	3 (1-5)	0.06
Time to first BM (d)	2 (1-5)	2 (1-5)	0.90
Vomiting (n,%)	7 (35)	9 (31)	1
NGT insertion (n,%)	1 (5)	2 (7)	1
Complication class (n,%)			
None	9 (45)	15 (52)	0.56
I	11 (55)	12 (41)	0.49
II	0	0	1
III	0	2 (7)	0.53
Postoperative stay (d)	3 (1-14)	5 (1-9)	0.18
30-day readmission (%)	3 (15)	2 (7)	0.39

BM bowel movement; NGT nasogastric tube;

Continuous variables expressed as median (range)

reimbursed costs. This data was statistically described and used as parameter estimations for a decision analysis model. Sensitivity analysis was performed with extremes defined by highest and lowest values reported. A societal cost of death was determined from actuarial estimations.

**Results/Outcome(s):** We identified 22,463 patients with a median age of 55 years, of whom 53.5% were male. Overall, 0.2% were diagnosed with a VTE within 30 days of surgery. Only 4.0% of patients obtained ePpx. VTE rates were 0.1% in the group obtaining ePpx versus 0.2% in those without ( $p=0.571$ ). Pulmonary emboli were 22.7% of VTE events in the no ePpx group and 0% in the ePpx group ( $p=0.080$ ). Pulmonary embolism conferred a 2.3% case fatality rate. Median cost for a generic prescription of ePpx was \$385. The median cost of hospitalization for VTE was \$16,203. Post-discharge bleeding events for readmission were 0.69% for those on ePpx versus 0.09% for those not ( $p<0.001$ ). The median cost for post-discharge bleeding was \$46,538. The societal cost of death was estimated to be \$7,900,000. Decision analysis demonstrated a benefit to withhold ePpx for this population with probability-based total societal costs of \$60 versus \$945. These findings were conserved after sensitivity analysis demonstrating that probability of a VTE event, case fatality rate, and the ratio of deep venous thrombosis to pulmonary embolism events were the primary determinants of optimized decision-making. For the majority of other assumptions, VTE rates of greater than 2.5% were most associated with supporting the use of ePpx.

**Conclusions/Discussion:** Very few patients are discharged on ePpx following colorectal cancer surgery despite supporting national guidelines. Risk of VTE is not significantly different in those who receive ePpx, but risk of bleeding is significantly higher. A decision analysis model of best available evidence does not support the use of extended VTE prophylaxis except in cases of markedly high VTE rates (e.g.,  $>2.5\%$ ). Future guidelines could be improved by recognizing the role of risk stratification to determine need for extended VTE prophylaxis.

## READMISSIONS AFTER COLORECTAL SURGERY: NOT ALL ARE EQUAL.

P69

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**Purpose/Background:** Few previous studies have evaluated readmissions in depth so as to specifically determine which may be preventable. The aim of this study is to evaluate all readmissions after colorectal resection, identify preventable readmissions, and then assess factors associated with such readmissions.

**Methods/Interventions:** Data related to all readmissions for patients undergoing colorectal resection from

May 2013-May 2016 at a single academic tertiary referral center were reviewed. Readmissions that could potentially be prevented were identified. Factors associated independently with preventable readmission were assessed using logistic regression.

**Results/Outcome(s):** Of 1202 patients discharged during the study period, 160 patients (13.3%) were readmitted. 43 readmissions (29% of all readmissions) were preventable, and these readmissions were most commonly due to dehydration or acute kidney injury, pain, ostomy complications, and gastrointestinal bleeding. There were no differences in rate of follow-up phone calls, office visits, or time to first call or first visit for readmissions deemed preventable and non-preventable. On regression analysis, the strongest preoperative risk factors associated with preventable readmission were urgent or emergent operation (OR 2.20, 95% CI 1.14, 4.22) and American Society of Anesthesiologist score  $\geq 3$  (OR 2.79, 95% CI 1.42, 5.46). Intraoperative risk factors associated with preventable readmission included intraoperative enterotomy (OR 4.14, 95% CI 1.18, 14.45) and intraoperative stapler complications (OR 28.02, 95% CI 1.72-455.93). Postoperative risk factors associated with preventable readmission included hemoglobin nadir  $< 9$  (OR 2.14, OR 1.077, 4.25) and continuation of antibiotics post-operatively (OR 1.98, 95% CI 1.020, 3.89).

**Conclusions/Discussion:** Only a third of readmissions after colorectal resection are preventable. However, current health care policies do not distinguish preventable from inevitable readmissions. Since specific patients and factors that are associated with preventable readmission can be identified, healthcare policies need to acknowledge the inevitability of certain readmissions and deploy resources primarily at the factors and patients associated with preventable readmissions.

## A CONCERTED PERIOPERATIVE OSTOMY EDUCATIONAL PROGRAM IMPACTS PATIENT OUTCOMES.

P70

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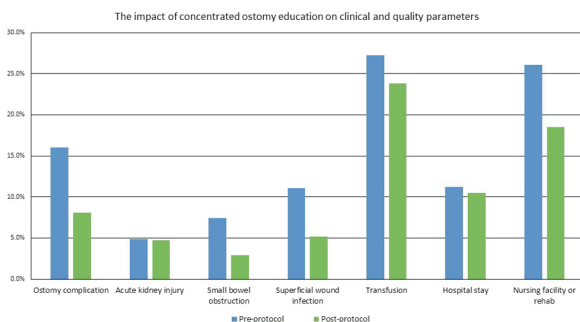
**Purpose/Background:** This study aims to evaluate the impact of a comprehensive ostomy education and management program for patients undergoing colorectal surgery with newly created ostomy.

**Methods/Interventions:** In mid-2013, a comprehensive ostomy management and educational program encompassing the preoperative, in-hospital postoperative, peri-discharge and in-home postoperative phases of perioperative care at a dedicated colorectal unit. The components of the program included preoperative education and site-marking; a structured routine for monitoring output,

education, and hands-on practice sessions; discharge care coordination specific to ostomy care; and post-discharge follow-up including home-care and follow-up phone calls prior to the first postoperative office visit. For all patients undergoing new ostomy creation during elective colorectal surgery from January 2007- December 2015, ostomy complications, acute kidney injury, small bowel obstruction, wound infection, transfusion, hospital stay and post-discharge independence were compared for patients pre-program (prior to June 2013) and post-program (after June 2013). Demographics, co-morbidities, type of ostomy, primary diagnosis, and procedure were also evaluated. Groups were structured to represent 1 pre-program to 2 post-program participants. Chi-squared test was used to compare categorical variables, while T-test and nonparametric test for continuous variables. Ileostomy and colostomy outcomes were additionally analyzed as a separate cohorts.

**Results/Outcome(s):** Of 253 patients with an ostomy meeting the criteria, 81 (32%) were pre-program, and 172 (68%) post-program. Ileostomy (66.7% vs. 65.1%) and colostomy (33.3% vs. 34.9%) creation were comparable between groups. Demographics and comorbidities, such as pulmonary, cardiovascular, cerebrovascular and renal diseases as well as ASA scores were similar. Pre-program patients had greater colorectal cancer and partial resection, whereas post-program patients had greater inflammatory bowel disease, diverticular disease and subtotal/total resection. Ostomy complications (16% vs. 8.1%), renal injury (4.9% vs. 4.7%), small bowel obstruction (7.4% vs. 2.9%), superficial surgical site infection (11.1% vs. 5.2%), transfusion (27.2% vs. 23.8%), length of stay (mean: 11.2 days vs. 10.5 days) and disposition to nursing facility (22.7% vs. 15.5%) were lower in the post-program group but did not reach statistical significance. In patients with a colostomy, superficial wound infection (22.2% vs. 6.7%,  $p=0.04$ ) and small bowel obstruction (14.8% vs. 3.3%,  $p=0.05$ ) were lower.

**Conclusions/Discussion:** The incorporation of a rigorous perioperative ostomy management and educational program into routine practice is feasible, and facilitates post-discharge independence and outcome improvement for ostomy patients.



## INITIATION OF SOLID DIET ON DAY OF COLORECTAL RESECTION IS SAFE AND ASSOCIATED WITH RECOVERY BENEFITS.

P71

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**Purpose/Background:** There is surgeon reluctance relating to the initiation of solid diet immediately after surgery. This study aims to evaluate the effect of solid diet introduced early after colorectal surgery on gastrointestinal recovery and postoperative outcomes.

**Methods/Interventions:** From a prospective outcomes database, patients who underwent elective colorectal resections from 2011 – 2016 were identified. Based on the timing of introduction of solid diet after surgery, patients were divided into: early (day 0 postoperatively) or late ( $\geq$  day 1 postoperatively) groups. The two groups were compared for demographics, co-morbidities, diagnosis and operative characteristics and outcomes including gastrointestinal recovery, hospital stay and postoperative complications. Categorical variables were compared using Chi-squared test, and presented as frequency (n) and percentages (%). T-test was performed to evaluate the significance of continuous factors and illustrated by mean  $\pm$  standard deviation (SD).

**Results/Outcome(s):** Of 703 included cases, 87 (12.4%) received early oral solid diet (on day of surgery), and 616 (87.6%) late. Patient demographics were comparable for the groups. There were more patients with higher wound class (class IV) in the early feeding group while the late feeding group had more patients with hypertension, disseminated cancer and higher American Society of Anesthesiologists scores. Inflammatory bowel disease was more common with early oral feeding while colorectal cancer and diverticular disease with delayed feeding. Surgical type, extent and operative approach were similar between groups. Operative time, ostomy creation and estimated blood loss were significantly greater in the late feeding group. Time to first flatus (mean: 3.2 vs. 3.4,  $p=0.42$ ) and bowel movement (mean: 3.3 vs. 3.5,  $p=0.32$ ), postoperative nausea and ileus were lower after early feeding but did not reach statistical significance. Early oral feeding was associated with a shorter hospital stay ( $< 3$  days: 79.3% v. 67.5%,  $p=0.03$ ). There were no differences in the overall postoperative complications between groups.

**Conclusions/Discussion:** Early introduction of solid diet after colorectal resection is safe, associated with recovery benefits, and should be routinely considered.



**P71 Patients characteristics, intraoperative features and postoperative outcomes stratified by oral feeding timing (early: day 0 vs. late:  $\geq$  day 1) postoperatively**

Variable	Early feeding N= 87	Delayed feeding N= 616	p-value
Age			
$\geq$ 65 years	39 (44.8%)	300 (48.7%)	0.5
Female	47 (54%)	319 (51.8%)	0.7
BMI			
Underweight	7 (8%)	25 (4.1%)	0.2
Normal	34 (39.1%)	207 (33.6%)	
Overweight	23 (26.4%)	211 (34.3%)	
Obese	23 (26.4%)	168 (27.3%)	
Unknown	0 (0%)	5 (0.8%)	
Hypertension	33 (37%)	309 (50.2%)	0.03
Myocardial infarction	2 (2.3%)	38 (6.2%)	0.1
Congestive heart failure	0 (0%)	25 (4.1%)	0.1
Prior cardiac surgery	2 (2.3%)	31 (5%)	0.2
Chronic Obstructive Pulmonary Disease	5 (5.7%)	28 (4.5%)	0.6
Dyspnea	2 (2.3%)	21 (3.4%)	0.6
Diabetes	15 (17.2%)	134 (21.8%)	0.3
Stroke	1 (1.1%)	21 (3.4%)	0.2
ASA classification			
I	3 (3.4%)	15 (2.5%)	0.01
II	58 (66.7%)	287 (47.6%)	
III	24 (27.6%)	284 (47.1%)	
IV	2 (2.3%)	16 (2.7)	
V	0 (0%)	1 (0.2%)	
Primary diagnosis			
Cancer	36 (41.4%)	388 (63%)	0.001
Diverticular disease	20 (23%)	110 (17.9%)	
Inflammatory bowel disease	9 (10.3%)	29 (4.7%)	
Other	22 (25.3%)	89 (14.4%)	
Resection type			
Right colon	32 (36.8%)	231 (37.5%)	1.0
Left colon	24 (27.6%)	158 (25.6%)	
Rectum	25 (28.7%)	176 (28.6%)	
Subtotal	2 (2.3%)	23 (3.7%)	
Other	4 (4.6%)	28 (4.5%)	
Surgical approach			
Open surgery	15 (17.2%)	121 (19.6%)	0.6
Minimally invasive surgery	72 (82.8%)	495 (80.4%)	
Conversion to open surgery	4 (4.6%)	68 (11%)	0.1
Postop day of first flatus, mean (SD)	3.2 (0.9)	3.4 (1.6)	0.4
Postop day of first bowel movement, mean (SD)	3.3 (1)	3.5 (1.7)	0.3
Postoperative nausea	30 (35.3%)	213 (35.4%)	0.1
Postoperative vomiting	18 (21.4%)	123 (20.4%)	0.8
Postoperative nausea or vomiting	33 (38.4%)	230 (37.7%)	0.9
Postoperative ileus	11 (12.6%)	105 (17%)	0.3
Postoperative hospital stay			
1-3 days	69 (79.3%)	416 (67.5%)	0.03
$\geq$ 4 days	18 (20.7%)	200 (32.5%)	
Intra-abdominal abscess	6 (7%)	22 (3.6%)	0.1
Surgical site infection (superficial/deep/organ space)	7 (8.1%)	47 (7.7%)	0.9
Bowel leak or sepsis	1 (1.2%)	25 (4.1%)	0.2
Readmission	8 (9.2%)	57 (9.3%)	1.0

Data illustrated as frequency (n) and percentage (%) unless indicated otherwise.

**DIAGNOSIS MATTERS: BENCHMARKING PATIENT SATISFACTION SCORES IN A COLORECTAL PATIENT POPULATION.**

P72

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**Purpose/Background:** As payment and care delivery models shift in the United States from episodic, fee-for-service care toward population health and value-based reimbursement, health care leaders are focused more than ever on patient engagement as a key to driving down costs and improving outcomes. An integral component of this new focus on quality is patient centered outcomes. One metric used to define patient satisfaction is the Press Ganey (PG) survey. However, the effect of diagnosis on PG scores is unknown and data is lacking to accurately benchmark these scores based on diagnosis. We hypothesize that diagnosis will have a significant impact on a patient’s PG score.

**Methods/Interventions:** Consecutive, adult patients seen in a tertiary care hospital’s colorectal clinic by physicians between 7/2015 and 9/2016 were randomly selected to complete PG surveys (scoring 0-100). Patients were stratified based on diagnosis: ano-rectal (AR), benign colorectal disease (B), neoplasia (Neo), and inflammatory bowel disease (IBD). Demographic and other patient level data was collected. Scores were compared using the Wilcoxon rank sum test and a linear regression model to control for confounding.

**Results/Outcome(s):** The response rate was 21.3% over the study period. 367 patients formed the study cohort. The mean age was 61.6 and 55% were women. Distribution of diagnoses was skewed toward ano-rectal and neoplasia (AR: 30%, B: 19%, IBD: 10% and Neo: 41%). IBD patients were younger (mean age (yr) AR: 60, B: 62, IBD: 55, Neo: 65; p=0.04) and benign patients had higher pain scores (AR: 5%, B: 13%, IBD: 5%, Neo: 2%; p=0.009). In an analysis of Overall PG Scores, patients

with a diagnosis of neoplasia had significantly elevated scores (AR: 75, B: 76, IBD: 77 and Neo: 83; p=0.04). There were similar significant increases in the Neoplasia group in the Care Provider and Personal Issues subsets. **(TABLE)** In a multivariable model including provider, pain score, visit type and age, the diagnosis of neoplasia persisted as significantly associated with increase PG scores ( $\beta$  : 8.0, Std Error 3.6 ; P=0.03).

**Conclusions/Discussion:** In a multi-physician, tertiary care colorectal clinic, PG scores were found to be significantly increased in patients with a neoplasia diagnosis. This has profound impact as we move toward including patient satisfaction an indicator of quality and as a metric for reimbursement. Diagnosis must be considered when comparing Press Ganey scores.

**COLORECTAL CANCER IN NONAGENARIANS: TREATMENT DECISIONS AND OUTCOMES.**

P73

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**Purpose/Background:** From 2008-2012, 12% of colorectal cancers were diagnosed in patients 85 years of age or older. Currently these patients represent 2% of the U.S. population, while it is estimated that by 2040, this age cohort will more than double in size. Consequently, the number of colorectal cancers diagnosed in the elderly will also rise. Cancer treatment in the elderly population poses several challenges, both physiologically and ethically. While several studies have looked at elderly patients with colorectal cancer, few have specifically examined nonagenarians as a subgroup. Our study examined outcomes of nonagenarians diagnosed with colorectal cancer at LVHN, as well as to determine some of the factors involved in the decision-making process regarding treatment choice.

**Methods/Interventions:** Retrospective review of patients in the LVHN Tumor Registry from the 10-year

**P72 Press Ganey Scores by Diagnosis**

Scoring Category	All (n=367)	Ano-rectal (n=112)	Benign (n=68)	IBD (n=36)	Neoplasia (n=151)	p value
Overall, mean	79	75	76	77	83	0.04
Access, mean	61	58	61	53	65	0.41
Care Provider, mean	86	82	81	86	90	0.04
Moving Through Visit, mean	58	54	57	56	61	0.69
Nurse Assistant, mean	76	70	80	71	81	0.06
Personal issues, mean	82	78	77	80	88	0.02

period 2005-2014. We identified those patients who had any surgical intervention, and those that chose no treatment. We then compared 1-year survival for the 2 groups. We also examined the factors involved in treatment decision, including Modified Frailty Score (MFS), presence of surrogate decision-maker, and presence of metastatic disease. For those patients who chose surgical intervention, we examined their outcomes, including postoperative morbidity and mortality, and long-term survival. Statistical analysis was performed using Chi-square analysis, logistic regression and independent t-test.

**Results/Outcome(s):** 106 patients were included in the study; 71 underwent surgical intervention, while 35 chose no treatment. Patients who chose surgical intervention had a higher 1-year survival compared to those who chose no treatment (54.9% vs 17.1%,  $p < 0.0005$ ). Metastatic disease ( $p < 0.0005$ ) and presence of surrogate decision-maker ( $p = 0.004$ ) were predictive of declining treatment. For patients in the surgery group, mean survival was 23.7 months, and 5-year survival was 9.9%. Most surgical patients had a procedure with curative intent (80.3%). Postoperative mortality for the group was 14%, while morbidity was 32.4%. Postoperative mortality for patients undergoing curative surgery was 8.8%. Increased Modified Frailty Score (MFS) was not found in patients declining treatment or in patients with poor surgical outcomes. In a subgroup analysis, increased MFS was associated with longer length of stay (12.1 vs 8.2 days,  $p = 0.022$ ), but not associated with delayed return of bowel function, increased surgical site infection or 30-day readmission rate.

**Conclusions/Discussion:** Nonagenarian patients diagnosed with colorectal cancer have a significantly higher 1-year survival with surgical intervention compared to those who decline treatment. Surgery can be performed in these patients with acceptable postoperative mortality and 1-yr survival, especially in those patients having curative resection. Modified Frailty Score was not useful as a predictor in neither treatment decision-making nor surgical outcomes.

#### ALVIMOPAN USE FOLLOWING GASTROINTESTINAL SURGERY IS ASSOCIATED WITH DECREASED LENGTH OF STAY.

P75

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**Purpose/Background:** Post-operative ileus (POI) following major abdominal surgery represents a significant economic burden nationwide. Alvimopan, a  $\mu$ -opioid antagonist, has been shown to reduce the length of stay (LOS) and decrease the time to return of bowel function among patients undergoing gastrointestinal surgery. Many institutions have incorporated alvimopan into their

enhanced recovery after surgery (ERAS) protocols for these reasons. ERAS protocols may also include non-narcotic pain regimens, such as acetaminophen, ketamine, gabapentin, or ketorolac. While many small studies have been conducted on the use of alvimopan, no data exists concerning its usage and effectiveness at the national level. The primary goal of this study is to examine the relationship between alvimopan usage with LOS and cost. The secondary goal of this study is to examine the relationship between intravenous (IV) and oral acetaminophen, IV ketamine, oral gabapentin, and IV ketorolac on LOS and cost.

**Methods/Interventions:** The Vizient, formerly University Healthsystem Consortium, database was queried for each hospital performing large and small bowel surgeries (diagnosis related groups 329-334) from January 2015 through December 2015. LOS and direct cost outcomes were reported as indices of the observed/expected values. Percentage oral alvimopan, IV and oral acetaminophen, IV ketamine, oral gabapentin, and IV ketorolac usage among hospitals was examined to predict outcomes using a multiple linear regression model. A backward model selection process was employed to identify statistically significant covariates to be added to the model. An alpha level of 0.05 was used throughout.

**Results/Outcome(s):** 128 hospitals were included with 46,220 cases. Median percent alvimopan usage was 1.6% (0-62.6%), median percent oral acetaminophen usage was 41.6% (0-95.1%), median IV acetaminophen usage was 30.8% (0-93.8%), median percent IV ketamine usage was 6.7% (91.5%), median percent gabapentin usage was 9.4% (0-72.5%), and median percent ketorolac usage was 36.5% (0-92.3%). Increasing alvimopan usage was associated with a decreasing LOS index ( $p = 0.017$ ) without a significant change in direct cost index. Increasing gabapentin usage was associated with an increase in LOS index ( $p = 0.0008$ ) and an increase in direct cost index ( $p = 0.002$ ).

**Conclusions/Discussion:** The use of alvimopan varies widely across institutions. Use of Increased usage of alvimopan is associated with decreasing LOS index following gastrointestinal surgery with no change in cost. Use of alvimopan in the care of patients undergoing gastrointestinal surgery should be strongly considered in ERAS protocols. The results concerning gabapentin correlating to an increasing LOS index and increase in direct cost index were surprising and require further investigation.

**TRANSANAL MINIMAL INVASIVE SURGERY- ANALYSIS OF 113 CONSECUTIVE CASES FROM SINGLE CENTER EXPERIENCE.**

P76

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**Purpose/Background:** The purpose of this study is to analyse the outcome of 113 cases of Trans anal minimal invasive surgery (TAMIS) done for rectal lesions in a single center

**Methods/Interventions:** The data of 112 consecutive cases were analysed retrospectively from hospital records from 2014-2016. Data regarding the demographics, operative details and pathological reports and complications are analysed.

**Results/Outcome(s):** Mean age of the patients was 58.37 years (Range 26-85years). Mean BMI was 25.3kg/m2 (range 17.3-35.6kg/m2). There are slight increase in male incidence 58%(66 male, 47 female). Included patients operated for TAMIS had American Society of Anesthesiologists (ASA) Physical Status of ASA 1in 19(16%)patients, ASA 2 in 63(56%), ASA 3 in 30(26%) patients. Most of the surgeries are done for malignancy, adenocarcinoma 55%(60/108). Mean operating time was 97.31 min(range from 17-265 min) Most of the lesion are in the lower rectum 54%(61/112), others included middle rectum-37(34%), upper rectum -10(8%). Average distance from the anal verge is 5.71cm(range from 2-13 cm). Post-operative histopathological examination had 64%(72) cases of malignant lesions. (Table 2). TAMIS is done for Tis -9 (8%)patients, T1- 19 (17%), T2- 14(15%), T3- 7(6%), Benign polyp- 27 (25%), GIST -1(0.9%), Carcinoid- 12 (11%), Endometriosis- 1 (0.90%), Complete response scar(post CCRT) 12(11%), No tumour found in resected lesions in6 (5%)of patients. Average thickness of tumour resected was 14.28mm(range from 2-37mm), maximum diameter of the specimen obtained in TAMIS was average 30.25mm(range from 4-80mm), average specimen volume obtained was 15.60 cu mm. Pedicle margin was positive in 4.6%(5/108) patients and one patient had fragmentation of specimen due to which margins cannot

be commented by the pathologist. These patients are under follow up for average of 12.2 months (range from 3-40 months). Recurrence occurred in 11% (12/108) of patients.one recurrence occurred in GIST patient after 4 ½ years which was reoperated through TAMIS. Two cases of recurrence initially had T1 lesions both with margin negativity had recurrence at 10 months and were reoperated by TAMIS and histopathologically showed T1 lesion with negative margins and had good postoperative recovery. There is no mortality in this series. In this series there was 5%(6/108)perforations(Table-1) and overall 7% (8/108) morbidity recorded. Other complication included one case of post-operative fever not requiring antibiotics and one case with urinary retention requiring recatheterization for 48 hours

**Conclusions/Discussion:** This study shows that TAMIS is possible alternative for major surgical resection. T3 pathology and tumour volume more than 25cumm has increase in chances of perforation in TAMIS. Reoperation for recurrence by TAMIS can be done with no added morbidity and achieving good margin status. TAMIS is safe alternative in patients having ASA 3 or high comorbid status.

**AN ELECTRONIC HEALTH RECORD- INTEGRATED COLON PATHWAY: EXAMINING VARIABLE DIRECT COST, OVERALL SAVINGS AND REDUCTION IN LENGTH OF STAY.**

P77

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**Purpose/Background:** Enhanced recovery after surgery (ERAS) pathways in colorectal surgery have been widely used to standardize post-operative care and have resulted in a decrease in length of stay (LOS), cost and post-operative morbidity. A multi-disciplinary team developed a comprehensive Colon Pathway that is fully integrated in our electronic health record (EHR) designed for all patients undergoing elective colon and rectal surgery.

**P76 Cases of perforation in TAMIS**

NUMBER	Lesion	Tumour volume(cumm)	Margin positivity	Tumour location in rectum	Detection of perforation	Treatment of complication
1	T1	14	negative	low/posterior	post operative	conservative
2	T3	26.5	negative	low/posterior	post operative	conservative
3	T2	40	negative	low/posterior	post operative	conservative
4	T3	50	negative	low/posterior	post operative	conservative
5	T3	24.5	negative	middle/posterior	post operative	diversion stoma
6	Tubulo villous adenoma	1.5	negative	middle/anterior	post operative	conservative

Table-1. Tumor characters and management of perforation in TAMIS

The pathway provides a clear evidence based plan of care that encompasses every phase of patient care with a goal of decreasing variable direct cost (VDC), defined as the total cost accrued to treat individual colorectal patients per elective surgery per patient and LOS. Unique to our pathway is its incorporation into the EHR, with pre-defined outcomes and variances measured and documented in the EHR as the patient progresses through their care. Our goal was to analyze the impact of the Colon Pathway on LOS, VDC, overall cost and savings.

**Methods/Interventions:** A university hospital, single institution prospectively gathered database was reviewed. The database comprised all patients undergoing elective colon and rectal surgery since the implementation of the Colon Pathway on March 2015 through June 2016. The average LOS and VDC per case were based on institutional data at our institution prior to pathway implementation. The expected LOS was based on the University Health System Consortium consensus. Inclusion criteria were all patients 18 years old or older, undergoing elective colon or rectal surgery (laparoscopic, robotic and open). Exclusion criteria was any patient undergoing emergency or non-elective colon or rectal surgery. Cost analysis using quarterly savings and observed/expected (O/E) data were included.

**Results/Outcome(s):** Three hundred and twenty seven (n=327) patients were successfully discharged on the pathway over five fiscal quarters. There was an average of 65.4 cases (range 58-72) per quarter. The overall cost savings since the implementation of the colon pathway

was \$1,717,998 with increasing cost savings per quarter. The VDC per case decreased every quarter, averaging a 20.6% savings compared to the pre-Colon Pathway VDC. The O/E LOS compared to the baseline was reduced 17.4%. The average LOS was reduced to 4.3 days from the pre-Colon Pathway LOS of 5.58 days (Table 1).

**Conclusions/Discussion:** Since the implementation of our EHR-integrated Colon Pathway for elective colorectal resections there has been a consistent reduction in VDC, overall cost and LOS. Our Colon Pathway has shown significant reductions of cost in treating colon and rectal patients. Integration of the Colon Pathway into the EHR with documentation, measurement and analysis of outcomes and variances is critical to the success of the Pathway.

**P77 Colon pathway savings over 5 fiscal quarters**

Table 1	Fiscal Quarters				
	Q3 FY 15	Q4 FY 15	Q1 FY 16	Q2 FY 16	Q3 FY 16
Pathway cases	65	66	66	58	72
Average LOS	4.35	3.83	4.77	4.77	3.97
Baseline Average LOS	5.58	5.58	5.58	5.58	5.58
% increase/decrease	-22%	-31%	-15%	-15%	-29%
O/E LOS	0.62	0.53	0.66	0.68	0.79
Baseline O/E LOS	0.8	0.8	0.8	0.8	0.8
% Increase/Decrease	-22%	-33%	-17%	-14%	-1%
VDC per Case	\$15,849	\$13,770	\$13,809	\$14,079	\$12,906
Baseline VDC per Case	\$17,739	\$17,739	\$17,739	\$17,739	\$17,739
% Reduction in VDC per Case	-11%	-22%	-22%	-21%	-27%
Total Savings for Pathway	-\$153,090	-\$317,520	-\$353,700	-\$333,060	-\$560,628
Cases per Quarter					

Table 1: Pre- and post-colon pathway quarterly data for the LOS, O/E and VDC. Cumulative savings for the 5 fiscal quarters was \$1,717,998.

## THE TANDEM IMPACT OF AN ELECTRONIC HEALTH RECORD-INTEGRATED COLON PATHWAY AND A TARGETED SURGICAL SITE REDUCTION PROTOCOL ON SURVIVAL SITE INFECTION RATES.

P78

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**Purpose/Background:** Surgical site infections (SSI) are a consistent problem for colorectal surgeons and their patients with patients undergoing colorectal surgery having an SSI at rates of 21-28%, double the rate of SSI's of non-colorectal patients. The NYU Colon Pathway Working Group developed an SSI reduction protocol and incorporated it into our established Colon Pathway. The Colon Pathway is an evidence based plan of care that encompasses every phase of patient care and is fully integrated into our electronic medical system. Our primary goal was to analyze the effect of the SSI reduction protocol on the SSI rate in patients undergoing elective colon and rectal surgery.

**Methods/Interventions:** An institutional review board protocol was used to prospectively gather and review SSI rates for all patients undergoing elective colon and rectal surgery since the implementation of the Colon Pathway in March 2015 and the SSI Reduction Protocol starting in the first quarter of 2016 through June 2016. SSI rates were compiled for the quarters proceeding and following the implementation of the Colon Pathway and the SSI protocol. Inclusion criteria were all patients 18 years old or older, undergoing elective colon or rectal surgery (laparoscopic, robotic and open). Exclusion criteria were any patient undergoing emergency or non-elective colon or rectal surgery.

**Results/Outcome(s):** Three hundred and twenty seven (n=327) patients were successfully discharged on the pathway over five fiscal quarters. There was an average of 65.3 cases (range 58-72) per quarter. After the initiation of the Colon pathway there was a reduction in the SSI rate from a high of 20.3% to 7.6%. After the introduction of the SSI reduction protocol there was a consistent additional decrease in SSI rates in each successive quarter to a low of 3.6% in the most recently examined quarter (Figure 1).

**Conclusions/Discussion:** Our EHR-integrated Colon Pathway and SSI reduction protocol has been effective in reducing SSI rates in patients undergoing elective colon and rectal surgery. Since implementation of the Pathway there has been a reduction in SSI rate in these patients by 54%. The addition of a targeted SSI reduction protocol has further decreased the SSI rate in these patients by an additional 29%. Critical to the success of this effort is the integration of the Pathways and SSI reduction protocol into the EHR as this allows documentation, measurement

and analysis of outcomes and variances as patients progress along the pathway.

Figure 1-

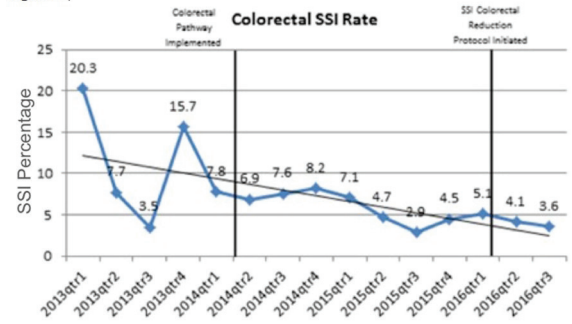


Figure 1: SSI rates since the implementation of the Colon Pathway and the SSI reduction protocol.

## ACUTE KIDNEY INJURY IN THE AGE OF ENHANCED RECOVERY PROTOCOLS.

P79

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**Purpose/Background:** Acute kidney injury (AKI) remains a prevalent post-operative complication after abdominal surgery. It is associated with a spectrum of patient morbidity and increased institutional expenses. As the adoption of enhanced recovery protocols (ERP) expands, there is concern for a concomitant increase in rates of post-operative AKI due to the focus on judicious fluid management, use of vasopressors, and administration of non-steroidal anti-inflammatory drugs (NSAIDs). This study aims to identify independent risk factors for AKI after colorectal surgery with the hypothesis that adoption of an ERP may result in an increased rate of post-operative AKI.

**Methods/Interventions:** All elective colorectal surgical cases performed between January 2010 and January 2016 at a single academic institution were identified, excluding patients with pre-operative stage 5 chronic kidney disease. A retrospective cohort study was conducted utilizing a prospectively collected database to compare the rate of AKI before and after implementation of an ERP in 2013. AKI was defined as a rise in serum creatinine over 150% of baseline within 30 days of surgery. Logistic regression adjusting for concurrent effects was used to identify predictors of AKI.

**Results/Outcome(s):** Nine hundred patients were identified, including 461 (51.22%) prior to and 439 (48.78%) following implementation of an ERP. ERP implementation resulted in less fluid administration (4183.96 mL  $\pm$  2270.86 mL vs. 1928.30 mL  $\pm$  1357.59 mL,  $p < 0.0001$ ) and higher use of NSAIDs (29.28% vs. 72.40%,  $p < 0.00001$ ) and intraoperative vasopressors (67.46% vs. 77.22%,

$p < 0.001$ ). One hundred fourteen cases (12.67%) were complicated by AKI, with no difference in rates of AKI following ERP implementation (12.57% vs. 13.44%,  $p = 0.31$ ). Five patients ultimately required hemodialysis with two cases occurring after implementation of the ERP. Patient-related factors, including hypertension, increased age, and high body mass index (BMI) were associated with AKI on bivariable analysis. Use of intraoperative vasopressors, ureteral stent, operative time  $> 200$  minutes, and decreased urine output on postoperative day one were also related to an increased rate of AKI. Conversely, laparoscopic surgery was associated with a lower rate of AKI. The presence of hypertension, ureteral stent, operative time  $> 200$  minutes, increased age, high BMI, and laparoscopic surgery retained a significant association with AKI in the multivariable logistic regression. Use of NSAIDs also reached significance (Table). The ERP was not independently associated with AKI.

**Conclusions/Discussion:** This study identified no difference in rates of AKI before and after implementation of an ERP in patients undergoing colorectal surgery. However, independent predictors of AKI were identified and could be utilized to alter the protocol in high risk patients. Future

study is needed to determine if protocol modifications will further decrease rates of AKI in this patient population.

#### AN ANALYSIS OF RISK FACTORS AND COMPLICATIONS ASSOCIATED WITH LAPAROSCOPIC CONVERSION IN LEFT-SIDED COLON RESECTIONS.

P80

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**Purpose/Background:** Laparoscopic conversion to an open approach in left sided colon resections is associated with increased morbidity. The purpose of this study was to estimate conversion incidence, risk factors, and analyze differences in complications.

**Methods/Interventions:** The Premier Perspective® Database containing billing data from ~600 U.S. hospitals was analyzed. Procedures and diagnoses were identified by International Classification of Diseases, Ninth Revision (ICD-9-CM) codes. Elective left-hemicolectomy (LHC) or sigmoidectomy (SIG) from 2009-2014 with an indication

**P79 Table: Association of Patient and Procedural Factors with Acute Kidney Injury.**

	Odds Ratio (95% CI)	p-value
<i>Patient Factors</i>		
Male	1.42 (0.87 - 2.32)	0.16
Age	1.24 (1.00 - 1.54)	0.04
Race (ref = White)		0.99
Asian	<0.01 (<0.01 - >999.99)	
Black	1.04 (0.44 - 2.50)	
Unknown	1.18 (0.21 - 6.57)	
Hispanic	1.43 (0.25 - 8.14)	0.69
BMI (kg/m <sup>2</sup> )	1.05 (1.01 - 1.08)	0.01
Diabetes	0.54 (0.27 - 1.10)	0.09
Hypertension	1.96 (1.13 - 3.39)	0.02
Renal insufficiency	1.06 (0.51 - 2.18)	0.87
<i>Procedural Factors</i>		
Laparoscopic	3.71 (1.90 - 7.26)	<0.001
Ureteral stent	2.45 (1.38 - 4.36)	0.002
Enhanced recovery protocol	0.61 (0.23 - 1.58)	0.31
NSAID	2.21 (1.25 - 3.92)	0.006
Intra-operative hypotension	1.56 (0.73 - 3.30)	0.25
Intra-operative vasopressor	1.21 (0.62 - 2.37)	0.58
EBL >500 mL	1.74 (0.71 - 4.28)	0.23
OR time >200 minutes	1.90 (1.10 - 3.29)	0.02
UOP post-operative day 0 (mL)	0.98 (0.66 - 1.44)	0.92
UOP post-operative day 1 (mL)	0.78 (0.60 - 1.00)	0.06

\*Abbreviations: BMI = Body mass index; NSAID = Non-steroidal anti-inflammatory drug; EBL = Estimated blood loss; OR = Operating room; UOP = Urine output.

\*Renal insufficiency = Stage 3 chronic kidney disease and higher.

\*C-index = 0.79.

of diverticulitis, colon cancer, diverticulosis, benign neoplasms, or inflammatory bowel disease (IBD) were evaluated. Surgical approaches were defined as: *OPEN* planned (open code only), laparoscopic attempted which was further characterized as either *LAP* successful (laparoscopic code without conversion [V64.41] or open code) or *CONVERSION* (conversion code or simultaneous open and laparoscopic code). For laparoscopic attempted procedures the incidence of *CONVERSION* was calculated. Patient and hospital risk factors for *CONVERSION* were evaluated with logistic regression accounting for hospital clustering. For all patients similar models for transfusion, anastomotic leak surrogate (*LEAK*), postoperative CT (*CT*), and mortality occurring within the hospitalization to evaluate the effect of surgical approach. P-values <0.05 (2-sided) were considered significant.

**Results/Outcome(s):** A total of 41,417 patients who underwent LHC (8,468) or SIG (32,949) were analyzed. There were 36.6% *OPEN* and 63.4% laparoscopic attempted procedures. The incidence of *CONVERSION* was 13.3%. Diverticulitis (59.1%) was the most common indication, followed by colon cancer (29.7%), diverticulosis (11.9%), benign neoplasm (10.8%), and IBD (1.2%); 10% of patients had multiple indications. Comorbidities included hypertension (49.7%), diabetes (15.2%), and obesity (13.3%). Colorectal specialists (CRS) performed 17.4% of the procedures. Overall complications rates were transfusion (6.4%), *LEAK* (12.4%), *CT* (6.4%) and mortality (0.5%). Relevant risk factors included: LHC, IBD, diverticulitis, diabetes, and obesity. CRS and robotics were associated with decreased odds of conversion. *CONVERSION* was associated with increased odds for postoperative complications compared to *LAP* (Table 1). There was no difference in the odds of transfusion or mortality for *CONVERSION* compared to *OPEN*. However the odds of anastomotic leak and *CT* were decreased in *OPEN* compared *CONVERSION*.

**Conclusions/Discussion:** Laparoscopic left sided colon resections are being performed with increasing frequency and are associated with fewer complications than open surgery. Conversion and planned open surgery had similar odds of complications, except for anastomotic leaks which were higher in converted patients. Colorectal specialists are associated with decreased odds of conversion.

**ANALYSIS OF DIVERTICULITIS RECURRENCE IN RELATION TO IMMUNOSUPPRESSION.**

P81

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**Purpose/Background:** Multiple small studies have found a higher rate of complications and mortality in the clinical course of diverticular disease in immunosuppressed (IS) patients. Current guidelines recommend a low threshold for surgical intervention in IS patients. We sought to compare outcomes of non-operatively treated IS and immunocompetent (IC) diverticulitis patients. The primary endpoint was rate of recurrent diverticulitis and whether recurrence was complicated or uncomplicated.

**Methods/Interventions:** This was a retrospective chart review that evaluated 163 patients admitted to a single tertiary care hospital from 2010-2015 for a diagnosis of diverticulitis. IC patients were matched to each IS patient on age, gender, tobacco use, and diabetes status, resulting in cohorts of 105 IC and 58 IS patients. Most common immunosuppression agents were prednisone (55%), dexamethasone (19%), and methotrexate (7%); most common indications for immunosuppression were collagen vascular disease (32%), arthritis (22%), and cancer (17%). Variables of interest were type of initial diverticulitis episode (complicated – abscess, perforation, fistula, stricture vs uncomplicated), incidence of recurrence, type of

**P80 Table 1 Effect of Surgical Approach on Postoperative Complications in Left Sided Colon Resections**

Complications Occurring within Hospitalization	LAP <sup>^</sup> vs OPEN*	Adjusted Odds Ratio	
		LAP vs CONVERSION+	OPEN vs CONVERSION
Transfusion	0.46 (p<0.0001)	0.45 (p<0.0001)	0.98 (p=0.78)
Anastomotic Leak Surrogate (LEAK)	0.59 (p<0.0001)	0.46 (p<0.0001)	0.78 (p<0.0001)
Postoperative CT	0.55 (p<0.0001)	0.46 (p<0.0001)	0.84 (p=0.0057)
Mortality	0.51 (p=0.0002)	0.41 (p=0.0003)	0.81 (p=0.31)

<sup>^</sup>LAP – Laparoscopic successful approach (laparoscopic code without conversion [V64.41] or open code)

\*OPEN – Planned open approach (open code only)

+CONVERSION– Laparoscopic conversion to open approach (conversion code or simultaneous open and laparoscopic codes)



recurrence (complicated vs uncomplicated), and mean time to recurrence. Variables were compared using Fisher's exact test and log-rank test.

**Results/Outcome(s):** Mean age of the IS and IC patients was 65, 57% were female, 42% used tobacco, and 22% had diabetes. The first episode requiring admission was complicated in 63 (50%) of IC patients and 35 (51%) of IS patients ( $p=1.00$ ). IS patients had a slightly higher number of recurrences (55% vs 51%,  $p=0.66$ ). Of those patients with a recurrence, there was no significant difference ( $p=1.00$ ) in the number of complicated recurrences (50% IS vs 49% IC). There was no significant difference ( $p=1.00$ ) in the likelihood of a complicated recurrence for IS and IC patients with history of a complicated 1st episode (73% vs 72%) or an uncomplicated 1st episode (41% vs 39%). There was also no significant difference ( $p=1.00$ ) in the number of abscesses (15% vs 16%), perforations (11% vs 12%), or strictures (2% vs 2%). However, if the 1st episode was uncomplicated, IS patients had a shorter mean time to recurrence compared to IC patients (2.4 years vs 4.7 years,  $p=0.06$ ).

**Conclusions/Discussion:** There was no significant difference in the rate of recurrence or number of complicated episodes between the IS and IC cohorts. In addition, there was no significant risk for a complicated recurrence based on the type of initial episode in both cohorts. These findings suggest a possible uniform approach to treatment regardless of a patient's immune status. However, since IS patients are at an increased risk for an earlier recurrence, there may be value in designing a more frequent clinical surveillance program or a more aggressive initial treatment approach for IS patients.

#### FACTORS ASSOCIATED WITH SHORT-TERM MORBIDITY AFTER COLECTOMY FOR CROHN'S DISEASE: AN ASSESSMENT FROM THE ACS-NSQIP.

P82

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**Purpose/Background:** This study aimed to identify the factors associated with short-term (30-day) morbidity in patients undergoing colon resection for Crohn's disease.

**Methods/Interventions:** Patients who underwent colon resection for Crohn's disease in 2015 were identified from the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database by using current procedural terminology codes. Demographics, preoperative, and operative factors were assessed and compared between two groups classified according to the presence or absence of postoperative 30-day complications.

**Results/Outcome(s):** 1643 patients met the inclusion criteria [mean age of 41.2 ( $\pm 15.5$ ) years, female 871

(53%)]. 60% ( $N=993$ ) of the procedures were performed laparoscopically and 128 cases converted to open. 95 patients (5%) were operated under emergency circumstances. 507 (30%) patients had at least one postoperative complication within 30 days of surgery. The most common complications were ileus (16%) and organ space surgical site infection (6%). Table summarizes the univariate comparison between the groups. Patients with postoperative 30-day morbidity were slightly older ( $43\pm 16$  vs.  $40\pm 15$ ), more often male (35% vs. 27%), hypertensive 18% vs. 14%), smokers (28% vs. 22%), weight loss 15% vs. 8%), and sepsis (14% vs. 5%). Male gender ( $p=0.03$ ), open surgery ( $p=0.0005$ ), older age ( $p=0.01$ ), preoperative weight loss ( $p=0.007$ ), absence of preoperative mechanical bowel prep ( $p=0.01$ ) were independent risk factors for 30-day postoperative morbidity.

**Conclusions/Discussion:** Preoperative optimization of the nutritional status and use of mechanical bowel preparation may improve the outcomes after colectomy for Crohn's disease. Due to its recovery benefits, laparoscopic technique seems to be index surgical treatment option for colectomy when feasible.

#### URINARY RETENTION IN EARLY FOLEY CATHETER REMOVAL AFTER COLORECTAL SURGERY.

P83

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**Purpose/Background:** Prolonged catheterization causes increased urinary tract infections, but early removal after surgery is linked to increased urinary retention. Urinary retention and urinary tract infection both cause patient morbidity, potentially increase length of stay in hospital and costs. In our colorectal surgery recovery protocol we began removal of the foley on postoperative day 2. The aim of this study is to determine the incidence of urinary retention and infection and potentially contributing factors in male patients.

**Methods/Interventions:** This is a single academic center retrospective cohort study in male patients 50 years or older undergoing elective colon or rectal surgery from January 2015 to October 2016. Females, patients with prior prostate surgery, pathology showing tumor extension to bladder or prostate and/or intraoperative urethral or bladder injury were excluded. In the latter days of the study prophylactic Tamsulosin 0.4mg PO daily was given three days before surgery and continued until discharge. A multivariate regression analysis was performed to determine potential risk factors for urinary retention including age, neoadjuvant chemoradiation, history of voiding difficulty, MIS vs. Open procedure, lesion location, operative time, ASA score, intra operative fluid balance, epidural

use, PCA use, post operative complications including anastomotic leak and ileus and prophylactic Tamsulosin use.

**Results/Outcome(s):** Ninety four patients were included in the analysis, 61 without and 33 with prophylactic Tamsulosin. Urinary retention rate was 12.77% and urinary tract infection rate was 5.32%. Operative duration and ileus were found to be independent risk factors for urinary retention with adjusted odds ratio of 1.02 [95%

CI: 1.01, 1.04],  $p=0.004$  and 6.76 [95% CI: 1.37, 33.41],  $p=0.02$  respectively. There was no significant association with age, neoadjuvant chemoradiation, history of voiding difficulty, MIS vs. Open procedure, lesion location, ASA score, intra operative fluid balance, epidural use, PCA use, complications and prophylactic Tamsulosin.

**Conclusions/Discussion:** The incidence of urinary retention and urinary tract infections at our institution

### P82 Comparison of demographics, preoperative and perioperative factors between the groups.

	Morbidity (+) N=507	Morbidity (-) N=1136	P-value
Age, years	43 ±16	40 ±15	<0.0001
Age groups			0.0004
< 45 years	279 (28)	730 (72)	
45-65 years	165 (34)	318 (66)	
> 65years	63 (42)	88 (58)	
Gender			0.0003
Female	235 (27)	636 (73)	
Male	272 (35)	500 (65)	
Nationality			0.05
White	395 (31)	897 (69)	
Black or African American	53 (37)	89 (63)	
Other*	5 (17)	25 (83)	
BMI, kg/m <sup>2</sup>	25.1± 6.3	25.1± 6.0	0.99
Diabetes Mellitus	21 (4)	32 (3)	0.16
Hypertension	94 (18)	165 (14)	0.03
Smoking	143 (28)	255 (22)	0.01
Weight loss‡	76 (15)	91 (8)	0.0001
Sepsis	69 (14)	62 (5)	<0.0001
WBC >11	129 (27)	194 (18)	<0.0001
Mechanical bowel preparation	202 (40)	625 (55)	<0.0001
Oral bowel preparation	183 (36)	545 (48)	<0.0001
ASA classification			<0.0001
1-No disturb	7 (1)	18 (2.6)	
2- Mild disturb	258 (51)	732 (64)	
3-Severe disturb	229 (45)	381(33)	
4- Life threat	12 (3)	5 (0.4)	
Emergency surgery	44 (9)	51 (4)	0.0008
Surgical approach			<0.0001
Laparoscopic	246 (25)	747 (75)	
Open	261 (40)	389 (60)	
Conversion (+)	44 (34)	84 (66)	0.007
Operative time, min	178.4± 85	156.4 ±66	<0.0001
Mortality	7 (1)	0 (0)	<0.0001
Length of stay, days	11.3 ±9.8	5.8±4.8	<0.0001
Readmission	147 (29)	63 (6)	<0.0001

Values are reported as mean ±SD or absolute values (%). \*includes Asian, Hispanic and Native Hawaiian or Pacific Islander nationalities. BMI: body mass index. ‡ patients with a greater than 10% decrease in body weight in the six month interval immediately preceding surgery as manifested by serial weights in the chart, as reported by the patient, or as evidenced by change in clothing size or severe cachexia. WBC: white blood cell count, ASA: American Society of Anesthesiologists

are high. Urinary retention was associated with operative duration and ileus, which could potentially be explained by more difficult cases. Urinary retention was not associated with rectal lesions location or prophylactic Tamsulosin. However, sample size is small such that further investigation to improve retention and infection rates is required.

### PREDICTORS OF LENGTH OF STAY AFTER COLORECTAL SURGERY: WHICH ERAS ELEMENTS REALLY MATTER?

P84

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**Purpose/Background:** The introduction of enhanced recovery after surgery (ERAS) protocols has shortened time to discharge after colorectal surgery. These protocols standardize perioperative care with multimodal interventions; however, it is unclear which aspects of the ERAS protocol contribute to decreased length of stay (LOS). The aim of this study is to evaluate what patient, operative, and anesthesia factors impact LOS following colorectal surgery on an ERAS protocol.

**Methods/Interventions:** An ERAS protocol was instituted at a single academic institution in 2013. Retrospective LOS data were collected on patients undergoing colectomy from 2006 to 2012 prior to the ERAS protocol (pre-ERAS). Prospective data were collected on patients undergoing colorectal surgery procedures under the ERAS protocol at a single institution between 2014 and 2016 (post-ERAS). Patient, operative and anesthesia variables were recorded post-ERAS. Mean LOS pre- and post-ERAS protocol were compared with independent samples *t*-test. A linear regression was performed to evaluate which variables predicted patient LOS post-ERAS protocol.

**Results/Outcome(s):** There was a significant decrease in the length of stay following institution of the ERAS protocol (pre-ERAS (n=170) M = 7.1, SD = 4.8 days vs post-ERAS (n=278) M = 3.7, SD = 2.3 days,  $p < .001$ ). Post-ERAS patients had a mean age of 51.4 years (SD = 15.3 years) and were 52.9% male. Multiple regression analysis was used to test if the patient traits (age, gender, BMI, smoking status, pre-operative weight loss, and ASA Class) and surgical factors (operative time, estimated blood loss, laparoscopic versus open approach, surgeon, and ostomy creation) significantly predicted participants' length of stay on the ERAS protocol. The results of the regression indicated the predictors explained 26.7% of the variance ( $R^2 = .22$ ,  $F(23,259) = 5.911$ ,  $p < .001$ ). While controlling for other operative and patient factors, patients who were older ( $\beta = .139$ ,  $p < .05$ ), male ( $\beta = -.165$ ,  $p < .05$ ), had longer operative times ( $\beta = 0.275$ ,  $p < .05$ ), an open approach ( $\beta = -.174$ ,  $p < .05$ ), and an ostomy created ( $\beta = .242$ ,  $p < .05$ ) experienced longer hospital stays. The

addition of anesthesia factors (intra-operative intravenous fluids, analgesia type and amount, patient temperature, nasogastric tube placement and foley catheter removal) to the regression resulted in minimal change in  $R^2$  from .267 to .295 ( $p = .195$ ) indicating these factors contributed insignificantly to the variance in LOS.

**Conclusions/Discussion:** Patient (age and gender) and operative (time, laparoscopic approach, and ostomy creation) factors predicted LOS following colorectal surgery on an ERAS protocol. Interestingly, patient comorbidities and anesthesia factors did not significantly explain variance in LOS despite variability of these elements. Following institution of ERAS protocols, focusing on specific patient and operative factors may better predict recovery after surgery.

### DO MEDICAID PATIENTS HAVE HIGHER READMISSION RATES AFTER MAJOR COLORECTAL RESECTIONS?

P85

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**Purpose/Background:** Readmission rate after surgical procedures range between 6%-25% after colorectal procedures. Factors cited for increased readmission include stoma creation, failure to air test an anastomosis, longer length of stay following initial surgery, discharge to a facility and having Medicaid insurance. 30-day readmission rate will be used as a metric to assess hospital care and reimbursement (both payment incentives and penalties) by the Center of Medicare and Medicaid Services (CMS). There is concern that hospitals caring for patients of lower socio-economic backgrounds, such as patients with Medicaid insurance, will have a higher readmission rate and will perform poorly according to CMS's readmission measures. This study aims to evaluate the effect of having Medicaid insurance on post-operative readmission following major colorectal surgery.

**Methods/Interventions:** A retrospective chart review of all patients who underwent a major colorectal procedure at a single, tertiary institution between January 2012 and December 2014 was performed. Post-operative complications resulting in readmission was compared between patients insured with Medicaid and non-Medicaid insurance (Medicare and private insurance). Both groups were matched for the surgical procedures they underwent. Exclusion criteria included age less than 18 years, pregnancy, simple diversion procedures without resection and ileostomy closures. The primary aim of the study was to compare readmission rates for Medicaid patients with patients with non-Medicaid insurance.

**Results/Outcome(s):** A total of 616 patients who underwent major colorectal operations were included in

this study. 31 patients (5%) had Medicaid insurance, 585 patients (95%) had non-Medicaid insurance (Medicare 247 patients and private insurance 338 patients). Following discharge, no significant difference in readmission rate was noted between the 2 groups. 2 patients (6.4%) in the Medicaid group were readmitted compared to 52 patients (8.8%) in the non-Medicaid group ( $p=0.47$ ). Reasons for readmission were similar in both groups including abdominal pain, seroma formation and wound infection.

**Conclusions/Discussion:** Based on this study, we conclude that at our tertiary care institution, providing equal peri-operative and post-discharge care to patients regardless of insurance type results in similar post-operative outcomes. Our study also indicates that readmission rates were similar in patient with Medicaid insurance and non-Medicaid insurance.

#### ELDERLY PATIENTS UNDERGOING COLECTOMY AND PROCTECTOMY REQUIRE MORE SUPPLEMENTAL NUTRITION WITH TPN.

P86

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**Purpose/Background:** Increasing numbers of elderly patients ( $\geq 80$  years) are undergoing colectomy and proctectomy. Total parenteral nutrition (TPN) is still commonly used to supplement oral nutrition in patients, following abdominal surgery. The aim of this study is to determine the rates of TPN use in this population and to determine costs of this supplemental nutrition.

**Methods/Interventions:** The Nationwide Inpatient Sample database was used to identify all patients who received colectomy or proctectomy from January 1, 1998 to December 31, 2011. The use of TPN was determined using ICD-9 Procedure codes. The relationship between patient demographics and supplemental nutrition use was assessed using a multivariate logistic regression model adjusting for patient co-morbidities and hospital characteristics.

**Results/Outcome(s):** 268,884 patients underwent colectomy or proctectomy over the study period; 37,715 (14.0%) patients age 80 or older. 10,444 (3.9%) of patients required TPN during their hospitalization, and this rate is significantly higher among elderly patients compared to younger patients (5.5% vs. 3.6%,  $p<0.001$ ). The use of TPN in the elderly cohort increased from 3.66% in 1998 to 5.44% in 2011 ( $p<0.001$ ). TPN use was similar in elderly patients undergoing proctectomy vs. colectomy (5.3% vs. 5.6%,  $p=0.329$ ). However in younger patients, proctectomy patients required TPN more often than colectomy patients (4.0% vs. 3.5%,  $p=0.009$ ). On multivariate analysis, age  $\geq 80$  is an independent predictor for TPN use. Elderly patients are 32% more likely to require TPN (OR 1.32, CI 1.25-1.39,  $p<0.001$ ). Other significant predictors

of TPN usage among all patients included male gender, black race, any comorbidities, in hospital complications, urban hospitals and calendar year. Additionally, TPN use increases hospital charges by \$47,266 per patient.

**Conclusions/Discussion:** Elderly patients are more likely to require TPN irrespective of comorbidities or in hospital complications. Supplemental nutrition is an important component of post-op operative care of the elderly patient. A quality improvement approach should be undertaken to anticipate the nutritional needs of elderly patients undergoing abdominal surgery.

#### REDUCTION IN CARDIAC COMPLICATIONS WITHIN AN ENHANCED RECOVERY AFTER SURGERY PROGRAM.

P87

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**Purpose/Background:** Enhanced Recovery After Surgery (ERAS) is a multimodal perioperative care pathway designed to achieve early recovery by preserving preoperative organ function and minimizing the stress response following elective colorectal surgery. This is the first study evaluating the impact of ERAS and goal directed fluid management on post-operative cardiac complications.

**Methods/Interventions:** A retrospective review was performed of individuals who underwent elective colorectal surgery at our single institution ( $N=815$ ). Starting in 2015 all patients undergoing elective surgery were enrolled into ERAS program ( $N=395$ ). The outcomes were compared to all elective surgery patients treated in calendar year 2013 prior to any ERAS practice ( $N=420$ ). Patient demographics including age and gender were captured as well as history of pre-operative coronary artery disease (CAD) and renal issues. Post-operative cardiac events including atrial fibrillation, tachycardia/bradycardia and myocardial infarction were analyzed. Fluid status was assessed intra-operatively and in the 24-hour post-operative period. Chi square tests were used for bivariate analyses of categorical variables (Fisher's exact test for  $<5$ ) and Student's T-tests were used for continuous variables. A logistic regression model was created to assess the impact of preoperative CAD on risk of post-operative cardiac events adjusting for fluid status.

**Results/Outcome(s):** The ERAS group received significantly lower average total 24 hour volumes of crystalloids (control=4.7L vs. ERAS=2.0L;  $p<0.001$ ), higher average total 24 hour volume of colloid (control=134mL vs. ERAS=511mL;  $p<0.001$ ), and lower total average total intravenous fluids (control=5.0L vs. ERAS = 3.4L;  $p<0.001$ ). The ERAS group also had significantly higher average *per os* intake (control=290 mL vs. ERAS=832mL;  $p<0.001$ ). Post-operatively there were significantly

higher rates of atrial fibrillation (control=5.24% vs. ERAS=1.77%,  $p=0.008$ ) and tachycardia/bradycardia (control=12.79% vs. ERAS=6.08%,  $p=0.003$ ) in the control group compared to the ERAS group. Ischemic events were low in both groups with no significant difference (control=0.48% vs. ERAS=0.76%;  $p=0.61$ ). Adjusting for history of CAD and total 24-hour intravenous fluid received, odds of postoperative arrhythmia were significantly lower in the ERAS group compared to the control group (OR=0.31, 95%CI 0.10 – 0.93;  $p=0.037$ ). Neither the 24-hour intravenous fluids or the intraoperative fluid volumes were significant independent predictors of atrial fibrillation. Even if ERAS group had a higher percentage of pre-operative renal disease (control=13 vs. ERAS=31;  $p=0.003$ ), there was no significant post-op rise in creatinine levels compared to controls (control=2 vs. ERAS=3;  $p=0.678$ ).

**Conclusions/Discussion:** Enhanced recovery after surgery (ERAS) and goal directed fluid management have a protective effect significantly reducing post-operative atrial fibrillation and tachy/brady arrhythmias.

#### COMBINED ANTIBIOTIC AND MECHANICAL BOWEL PREPARATION IS ASSOCIATED WITH LOWER ANASTOMOTIC LEAK FOR ALL TYPES OF COLECTOMY.

P88

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**Purpose/Background:** The use of and type of bowel preparation prior to colorectal resection is an ongoing debate. Recent studies report conflicting results on the benefit of mechanical bowel preparation (MBP) and oral antibiotic bowel preparation (OABP) relating to anastomotic leak. Surgeon preferences also differ with regard to the use of bowel prep for right versus left sided colectomy.

Our goal was to determine if type of bowel preparation impacts anastomotic leak rates and determine if this effect is dependent on anatomic location.

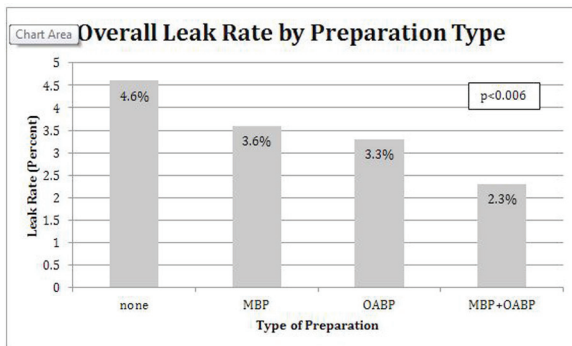
**Methods/Interventions:** We used the 2012-2015 ACS-NSQIP targeted colectomy dataset, and excluded emergency cases and any cases with a CPT code indicating ostomy creation or diversion. Right sided colectomy was identified with CPT codes for ileocectomy, and left sided colectomy with codes for colectomy with splenic flexure takedown or low anterior resection. Chi square with Bonferroni corrections were used to adjust for multiple comparisons. Multivariable logistic regression controlled for potential confounders, independently and with an additive interaction model.

**Results/Outcome(s):** 57,285 cases met inclusion criteria. Of the 40,142 (70.1%) who had a bowel prep, 18,381 (32%) had MBP only, 2,314 (4.0%) OABP only, and 19,447 (34%) had MBP+OABP. The overall leak rate was 3.4% ( $n=1,975$ ), lowest with MBP+OABP (2.3%), followed by OABP only (3.3%), MBP only (3.6%), and no preparation (4.6%) ( $p<0.006$ ). Left sided colectomy ( $n=19,299$ ) had an overall preparation rate of 79% with an overall leak rate of 3.6%. MBP+OABP provided the lowest leak rate of 2.2%, compared to 5.3% with no preparation ( $p<0.001$ ). Right sided colectomy ( $n=14,828$ ) had a preparation rate of 60% with an overall leak rate of 3.1%. MBP+OABP provided the lowest leak rate of 2.0%, compared to 4.1% with no preparation ( $p<0.001$ ). Following multivariable adjustment, the use of any bowel preparation resulted in a 34% reduction in leak risk compared to no bowel preparation (95% CI 0.60-0.72). MBP+OABP was the most effective preparation, resulting in a 49% lower leak rate (0.45-0.57). Antibiotic prep alone resulted in the next lowest leak rate (OR 0.72, CI 0.57-0.92), followed by MBP alone (OR 0.80, CI 0.72-0.89). An additive model showed MBP contributes to a decrease in leak rate of 22% (0.71-0.87), and OABP contributed to a decrease of 35% (0.58-0.73).

P87

	Control (N=420)		ERAS (N=395)		p-value
	N	%	N	%	
Renal, pre-op	13	3.12	31	7.85	0.003
CAD, pre-op	35	8.41	38	9.62	0.548
Atrial fibrillation, post-op	22	5.24	7	1.77	0.008
Tachy/Brady, post-op	33	12.79	24	6.08	0.003
Renal, post-op	11	2.62	8	2.03	0.575
MI, post-op	2	0.48	3	0.76	0.678
	Mean	SD	Mean	SD	
Crystalloid, 24hr	4655	1822	2018	880	<.001
Colloid, 24hr	134	313	511	444	<.001
Total IVF, 24hr	5053	1991	3399	1130	<.001
PO intake, 24hr	290	394	862	553	<.001

**Conclusions/Discussion:** This study demonstrates that bowel preparation before colectomy, regardless of method or segment of colon removed, results in a decrease in anastomotic leak. In contrast to prior studies, our data show that either preparation, MBP or OABP alone as well as combined, is superior to no preparation. One third of the included cases did not use any form of bowel preparation, more often omitted in right sided colectomies. Our data suggest that the practice of preferential bowel preparation based on anatomic site, comes with an increased risk of anastomotic leak.



## COMPREHENSIVE ROBOTICS CURRICULUM IN GENERAL SURGERY RESIDENCY.

P88A

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**Purpose/Background:** Robotic surgery has become a rapidly increasing field within general surgery. In 2014, 570,000 robotic da Vinci cases were performed worldwide, a 178% increase compared to 2009. Training programs have focused mostly on training attending surgeons and resident training in robotics has lagged behind. However, the demand for robotic-trained surgeons continues to increase. New graduates will likely be asked in the coming years to provide documentation of robotics exposure and experience from residency. Here we outline the steps taken to develop and introduce a comprehensive Robotics Curriculum for the General Surgery residents at our program.

**Methods/Interventions:** There was no formal robotics curriculum for current residents at a single academic General Surgery Residency Program, Rutgers – Robert Wood Johnson Medical School. Our curriculum was developed using an assessment of current best practices for robotic training and then coordinated efforts at our three clinic sites based on the robotics program at these three sites to finalize the current curriculum. The robotics curriculum was made mandatory for all categorical general surgery residents. Two levels of training were created: a basic (required) curriculum, and an advanced (optional)

curriculum. The basic curriculum required completing and passing the da Vinci online modules, completing two dry lab sessions lead by a da Vinci representative, bedside assisting five robotic cases, completing six simulator modules with a score of greater than 80%, and performing at least five cases as the console surgeon, performing at least 50% of each case.

**Results/Outcome(s):** Development of the curriculum did need adjustments due to the total number of cases available for residents to participate in. Initially, we had planned to have all categorical residents work towards an Intuitive proficiency certificate, which requires 30 console cases. Ultimately, we decided to focus on a basic curriculum for all residents to fulfill, with the option to complete the certificate for those residents with an interest in Robotic Surgery. The curriculum was implemented July 1, 2016. To date 50% (17 of 34) of categorical general surgery residents completed the da Vinci online modules, 47% (16 of 34) have completed the introductory dry lab, and 82% (28 of 34) have completed at least 5 bedside assist cases.

**Conclusions/Discussion:** A successful robotics curriculum must be multifaceted involving reading, simulation, bedside assisting, didactic sessions, and console/operating room training. By creating a two-tiered system within our general surgery residency, basic proficiency will be documented by all categorical residents while allowing residents interested in achieving advanced robotic skills the option to obtain certification. Our curriculum begins to formalize robotics training, which improves resident autonomy and education, as well as ensures patient safety and quality outcomes.

## POSTDISCHARGE VENOUS THROMBOEMBOLISM PROPHYLAXIS FOR COLORECTAL SURGERY PATIENTS.

P88B

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**Purpose/Background:** There is a high incidence of VTE in the United States each year, with a significant number of people developing a VTE that is associated with recent hospitalization and/or surgical procedure. Furthermore, VTE related complications raise healthcare costs and are responsible for a significant number of premature deaths each year. Colorectal cancer (CRC) patients represent a high risk group for VTE; therefore a number of treatment guidelines have been proposed for expanded postoperative DVT prophylaxis following hospital discharge for CRC patients. The purpose of this study was to examine the administration, compliance and complications of post-discharge chemical VTE prophylaxis (pdVTE) among CRC patients at a tertiary cancer center to help inform policy creation.

**Methods/Interventions:** This is a retrospective study of CRC patients who underwent resection in 2015. Charts were analyzed for patients who received pdVTE and patients were contacted within 30 days post procedure for follow up. Chi-squared tests were then performed.

**Results/Outcome(s):** 108 CRC patients were analyzed. 42% (n=45) were discharged with a prescription for enoxaparin for pdVTE and 7.4% were on another form of anticoagulation at the time of discharge (n=8). 62% of patients that were prescribed enoxaparin filled the prescription and 93% of those patients reported taking the medication. The overall rate of VTE 30 days post procedure was 3.7% (n=4). Among patients that had VTE, 75% were discharged on a prescription for enoxaparin (n=3) and all of those patients filled the prescription. Furthermore, 100% of those patients reported compliance with taking anticoagulation; 2 patients were on enoxaparin and 1 patient was bridged with enoxaparin to warfarin. The rate of VTE in patients on pdVTE was 5.9% versus 2.7% for patients with VTE not on pdVTE (OR 2.3, CI 0.3-17.1,  $p < 0.001$ ).

**Conclusions/Discussion:** There was a high rate of self-reported compliance to pdVTE in CRC patients despite the relatively low clinician adherence to pdVTE protocol. However, the majority of post CRC surgery VTE events occurred in patients who were already on anticoagulation. There needs to be improved quality improvement measures to facilitate increased compliance with pdVTE prophylaxis and further detailed analysis to determine the overall benefits of this strategy in larger patient populations.

## PRACTICE MAKES PERFECT: VALIDATION OF A LOW FIDELITY SIMULATOR FOR ANORECTAL SURGERY.

P89

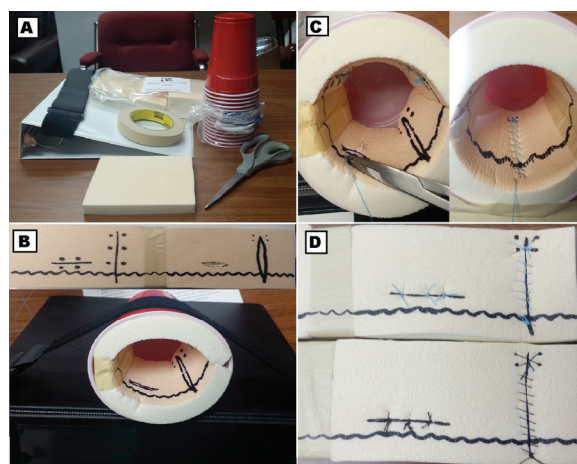
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**Purpose/Background:** With ACGME-mandated reductions in resident work hours and the subsequent decrease in hands-on technical experience, high and low fidelity simulation has become an essential component of modern surgical education. Surgical simulators have the potential to bridge the gap in technical skills created by work hour restrictions, thus reducing cognitive overload in the operating room (OR) and allowing the resident to gain more from their OR experience. Despite its unique complexities, anal surgery has not been previously described in the simulation literature. Our previous pilot study evaluated the feasibility of a low-cost simulator for anorectal surgery, and our current study aimed to validate this simulator and prepare it for widespread utilization.

**Methods/Interventions:** The anal canal suturing model was constructed at a cost of \$11/simulator (Figure 1). Three separate workshops were conducted from August 2014 to July 2016. Fellowship-trained colorectal surgeons were designated as experts, with first-year surgical residents as novices. Face and content validity were assessed with two separate questionnaires using a 5-point Likert scale (4 face questions for the entire group and 6 content questions for the experts). The cutoff for validity was set at a mean Likert score of 4 based on previous literature. Construct validity was assessed by comparing experts and novices for 1) time to completion of tasks [longitudinal hemorrhoid excision/closure (LC) and transverse wound closure (TC)] and 2) quality of suturing and knot tying as graded by a blinded expert observer. For 80% power, the study required 4 experts and 18 novices based on a predicted 35% reduction in time to task completion among experts.

**Results/Outcome(s):** Our study involved 4 experts and 20 novices. Mean scores greater than 4 were obtained for all 10 questions (range 4-4.75), confirming face and content validity. Construct validity was also established with times to task completion being significantly lower for the expert group [LC 195 vs 477 seconds ( $p < 0.001$ ) and TC 79 vs. 191 seconds ( $p < 0.001$ )]. The quality of suturing (LC  $p = 0.001$ , TC  $p = 0.01$ ) and knot tying (LC  $p < 0.001$ , TC  $p = 0.03$ ) was significantly higher for experts as well. Post-hoc power analysis for time to task completion as well as the suturing and knot-tying scores for these 24 subjects showed 100% power for the study.

**Conclusions/Discussion:** We achieved face, content, and construct validity for our low cost and low fidelity anorectal surgery simulator. We believe this simulator will be a useful instrument in the education of surgical trainees, allowing them to obtain proficiency in certain anorectal suturing tasks prior to working on live patients, and thus providing a higher yield from their time in the operating room.



A: Materials, B: Suture pad with tasks, C: Timed completion of TC and LC, D: Suturing and knot tying evaluated by a blinded expert observer

**SHOULD WE BE QUICK TO DISMISS  
NON-SPHINCTER SPARING SURGERY FOR  
FISTULA-IN-ANO: AN ANALYSIS OF  
LONG-TERM OUTCOMES.**

P90

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**Purpose/Background:** Although fistulotomy has been the mainstay of treatment of fistula-in-ano (FIA), fear of resulting fecal incontinence (FI) has prompted the emergence of sphincter-sparing techniques that may result in higher recurrence. This study aimed to compare long-term risks of FI and recurrence following sphincter-sparing and non-sphincter-sparing procedures for FIA.

**Methods/Interventions:** After institutional review board approval, all patients with FIA managed operatively between 2000-2012 by colorectal surgeons at a tertiary center were included. Patients with inflammatory bowel disease, pelvic radiation, and non-definitive procedures were excluded. Medical records/operative reports were reviewed. Patients were contacted by telephone to document FI using the Cleveland Clinic Florida-Fecal Incontinence Score (CCF-FIS) and Fecal Incontinence Quality of Life (FIQL) scale. Fistulas were characterized by type, location, branching, number of internal openings, classification as high or low, and primary or recurrent fistula. Procedures were classified as sphincter-sparing [ $\geq 1$  of fibrin glue, anal plug, anorectal flap, ligation of intersphincteric fistula tract (LIFT)] or non-sphincter-sparing [fistulotomy, cutting seton].

**Results/Outcome(s):** Of 338 patients, 156 were available for long-term follow-up: 119 (76.3%) and 37 (23.7%) had non-sphincter-sparing and sphincter-sparing procedures, respectively. Median follow-up was 9.1 years (6.5, 12.6). The proportion of females was similar in sphincter-sparing and non-sphincter-sparing groups (29.7% vs. 20.2%,  $p=0.223$ ). The sphincter-sparing group had fewer referred recurrent (5.4% vs. 29.4%,  $p=0.003$ ) and posterior (27.0% vs. 52.1%,  $p=0.008$ ) fistulas, but more high fistulas (73.0% vs. 15.1%,  $p<0.001$ ). No patients with sphincter-sparing surgery had FI vs. 21 (17.6%) with non-sphincter-sparing procedures who did (CCF-FIS range 0-15, median 0), 2 (1.7%) of whom had moderate-to-severe symptoms (CCF-FIS score  $\geq 10$ ). Median FIQL scores (range 1-4; 4=not affected) were lifestyle 4.0 (2.0-4.0); coping 4.0 (1.33-4.0); depression 4.0 (1.30-4.0); embarrassment 4.0 (1.33-4.0). Fistula recurrence was significantly greater in sphincter-sparing procedures (59.5% vs. 19.3%,  $p<0.001$ ). After adjusting for follow-up, high fistula, and posterior location on multivariate analysis, sphincter-sparing procedures were associated with higher odds of recurrence vs. non-sphincter sparing procedures (OR=5.72 [95%CI 2.02-16.17]). Non-primary fistula was

a predictor for recurrence after repair in both groups (OR=2.73 [95%CI 1.08-6.90]).

**Conclusions/Discussion:** Sphincter-sparing procedures had significantly higher recurrence rates vs. non-sphincter-sparing procedures. Long-term rates of significant FI after non-sphincter-sparing procedures were low and did not impact quality of life, indicating that these procedures remain a safe option with appropriate patient selection.

**EFFECT OF BODY MASS INDEX ON  
RECURRENCE OF RECTAL PROLAPSE AFTER  
SURGICAL REPAIR.**

P91

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**Purpose/Background:** Rectal prolapse is a common benign anorectal disease with many reported risk factors; however, there is little data available regarding the effect, if any, of a patient's body mass index (BMI) on the recurrence of rectal prolapse. Our study was designed to determine if a patient's BMI is a factor in recurrence of rectal prolapse after surgical repair. We hypothesize that recurrence of rectal prolapse after surgical repair will be higher with increasing BMI class.

**Methods/Interventions:** Patient charts from our outpatient colorectal surgery office between August 2012 to present (October 2016) were retrospectively reviewed with an ICD-9 (569.1) or ICD-10 (K62.3) code of rectal prolapse. Patients were included in the analysis if there was documented evidence of rectal prolapse on physical exam. Patient information including age, gender, BMI, type of rectal prolapse repair, recurrence, and subsequent rectal prolapse repair were compiled into an Excel spreadsheet. A total of 175 patients were found to meet inclusion criteria and 41 patients had documented recurrent rectal prolapse. These patients were further stratified into BMI class consisting of underweight ( $<18.5$  kg/m<sup>2</sup>), normal weight (18.5-24.9 kg/m<sup>2</sup>), overweight (25.0-29.9 kg/m<sup>2</sup>), obesity I (30.0-34.9 kg/m<sup>2</sup>), obesity II (35.0-39.9 kg/m<sup>2</sup>), and extreme obesity (obesity III) (40.0 kg/m<sup>2</sup> or more). Patients without a documented BMI within their chart were excluded from the final analysis.

**Results/Outcome(s):** The number of patients with recurrent rectal prolapse per BMI class are as follows: Underweight ( $<18.5$  kg/m<sup>2</sup>): 2 patients (2/14 total or 14.3%) Normal (18.5-24.9 kg/m<sup>2</sup>): 12 patients (12/86 total or 14.0%) Overweight (25.0-29.9 kg/m<sup>2</sup>): 12 patients (12/34 total or 35.3%) Obesity I (30.0-34.9 kg/m<sup>2</sup>): 6 patients (6/19 total or 31.6%) Obesity II (35.0-39.9 kg/m<sup>2</sup>): 6 patients (6/9 total or 66.6%) Extreme obesity (obesity III) (40.0 kg/m<sup>2</sup> or more): 2 patients (2/4 total or 50.0%) BMI not documented: 1 patient

**Conclusions/Discussion:** We found a near linear increase in the number of patients with recurrent rectal



prolapse with increasing BMI, thus supporting our hypothesis. Interestingly, the obesity II class (35.0-39.9 kg/m<sup>2</sup>) had the highest recurrence rate of 66.6%. Limitations of our study include its retrospective nature and limitations of a chart review, such as missing documented BMI or physical exam findings. Future research is needed to better characterize this relationship of BMI and rectal prolapse recurrence.

## DAYS OFF WORK AFTER ANAL FISTULA SURGERY: A MULTICENTER STUDY.

P92

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**Purpose/Background:** Fistula surgery is the most common anal procedure for the coloproctologist. There is not recent published data concerning impact of postsurgical days off work (DOW) after fistula surgery. To get an accurate view, we conducted an study to determine the DOW after fistula surgery and compare it between patients with government health insurance (GHI) versus patients self employed without insurance (SE).

**Methods/Interventions:** Medical records of patients who underwent fistula surgery from 3 institutions between January 2015 to July 2016 were reviewed retrospectively and subsequently contacted by phone. Only patients working during at least one month before the index surgery were included. Variables analyzed: DOW, type of insurance, fistula type, previous fistula surgery, previous anal surgeries and fistula surgical technique. Means with standard deviation (SD) and t-test were used to compare continuous data from groups. Categorical data was analyzed as frequencies and percentages and compared using X<sup>2</sup> test.

**Results/Outcome(s):** Ninety-three patients were included, 11.8 % had undergone one previous anorectal surgery and 16.2% had undergone 2 or more previous anorectal surgeries (range 3-6). Previous fistula surgery was recorded: 2 subjects GHI group and 15 subjects SE group. The fistula types were: intersphincteric 17.2%, transphincteric 44.1% and not specified 38.7%. Types of fistula surgery were: fistulotomy 26.9%, fistulectomy/sphincter repair 53.8%, seton 9.7%, flap 1.1% and other technique 8.6%. In both groups together (GHI and SE), the mean DOW was 25.4 (SD 23.9). DOW showed significant difference between the 2 groups: GHI group 42 days versus SE group 21 days (p=0.001). The GHI group was matched for age and sex with 18 subjects from the SE group, again significant difference was seen: GHI 42 days and SE 23.8 days (p=0.025). There was a significant difference in DOW between second level hospital patients

versus third level hospital patients. (Table 1) 46.2% of the patients had more than 15 DOW and 35% had more than 21 DOW. The main reasons for DOW after 15 days were: 1) anal pain 21.5%, 2) surgeon decision not specified 5.4%, 3) patient fear of a complication 5.4%, 4) abundant exudate from the wound 4.4% and 5) not documented 9.7%. At 3 months of follow up, 13.2 % of the patients were diagnosed with fistula recurrence.

**Conclusions/Discussion:** Type of insurance coverage was an statistical significant variable for DOW after fistula surgery. Usually, patients with complex fistulas are treated in third level centers. The second level hospital patients were only treated with fistulotomy and fistulectomy with primary repair. Patients with plug devices, fibrin glue and VAAFT were not included. This last techniques have been reported to improve postoperative recovery and have less than 15 DOW. Based in our data, and taking into account the type and the surgery performed, 15 DOW is not enough time for recovery after an anal fistula surgery,.

P92	
Variable	Mean (SD) or %
Age	45.2 (10.25)
Gender	Female 19.4% Male 80.6%
Type of work	Primary activities: 0% Secondary activities 10.4% Tertiary activities 79.6%
Comorbidity	Diabetes mellitus 11.8% Hypertension 17.2% Morbid obesity 5.4% HIV 2.2% Asthma 2.2%
Days off work according to fistula surgery	Fistulotomy 32.8 (32.6) Fistulectomy w/repair 17.7 (16.8) Seton 33.1 (18.2) Flap 28 (0) Other technique 43.1 (23.2)
Days off work according to Hospital level	Level two for SE 12 (3.9) Level three for SE 32.3 (28.7) Level three for GHI 42.1 (24.9)

## THE MODIFIED HANLEY TECHNIQUE FOR OUTPATIENT MANAGEMENT OF DEEP POSTANAL SPACE ABSCESS IS SAFE AND EFFECTIVE.

p93

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**Purpose/Background:** Deep post-anal abscesses are difficult to treat due to their location, transsphincteric fistulous component, and ischiorectal extensions. The Hanley procedure is the classic treatment but requires complete sphincter transection, which results in a large wound and high rate of incontinence. The Modified Hanley procedure has been proposed as an alternative treatment to limit these complications. This is achieved by limiting the initial surgical incision and leaving the external sphincter intact and placing a cutting seton for controlled, slow transsphincteric fistulotomy. The aim of this study is to assess a single-institution's outcomes for the Modified Hanley procedure in the treatment of deep post-anal abscesses.

**Methods/Interventions:** We performed a retrospective chart review of patients who have undergone surgical treatment for perianal fistulas at our institution from 9/2008 to 4/2016. Patients were identified using the MCW cohort discovery tool (i2b2 and Honest Broker) by querying electronic medical records for CPT codes which correspond to incisional or excisional procedures of the anus. We excluded all patients with inflammatory bowel disease. Demographic, procedural, and clinical data were collected. Patients were contacted by telephone to assess bowel function after recovery.

**Results/Outcome(s):** A total of 493 patients had surgical treatment for perianal fistulas. Twenty-five (5%) patients underwent a Modified Hanley procedure. Of these, four (16%) patients had a seton placement prior to the definitive procedure with one (4%) patient also having additional prior treatment with a biologic fistula plug. Sixteen (64%) patients had the Modified Hanley as their first procedure. In total, twenty-one (84%) had complete resolution of their deep post-anal abscess and fistula with a Modified Hanley procedure. The average time from procedure to full recovery and wound healing was 8.9 months with a range of 3.5-24 months. Setons were tightened an average of 2.5 times. Of the 26 patients contacted, 7 completed the telephone survey, 1 declined, and 18 were unable to be reached. The MSKCC Bowel Function Instrument reflects patients' perceptions of change in bowel habits; median score was 74 (best = 90, range 48-87). The EQ-5D-5L Quality of Life survey assesses patients' quality of life in terms of mobility, self-care, usual activities, pain, anxiety, and depression; median score was 6 (best out of a = 5, range 5-10). The median for the EQ-5D-5L visual scale was 85 (best = 100, range 47-99). This score is a patient's rating of their overall health.

**Conclusions/Discussion:** The Modified Hanley procedure is a safe outpatient alternative for treatment of deep post anal space abscesses with few long-term consequences. Wound healing was complete in all patients with minimal need for additional procedures. Post-operative incontinence was a rare occurrence and function and quality of life following healing were excellent.

Outcome	Modified Hanley Results	
	Average	Range
Time to complete healing	8.9 months	3.5 – 24 months
Number of seton tightenings	2.5 tightenings	0 – 5 tightenings
Number of post operative visits	12.5 visits	3 – 39 visits
MSKCC Bowel Function Instrument	74*	48 – 87
EQ-5D-5L QOL Instrument	6*	5-10
EQ-5D-5L QOL visual scale	85*	47 - 99

\* Represents median values  
QOL = Quality of Life

## TREATMENT STRATEGY FOR EXTERNAL HEMORRHOIDAL THROMBOSIS.

P94

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**Purpose/Background:** External haemorrhoidal thrombosis is a very common disease, which is characterized by a sudden onset and a painful node. Despite of its frequent occurrence a standardized approach is not established.

**Methods/Interventions:** All patients with external haemorrhoidal thrombosis had had initial conservative management by Diclofenac and warm sitz baths for 5 days. In case of persistent pain surgical treatment was recommended. In lithotomy position only a small, cuneiform anodermal excision was performed and the external haemorrhoidal thrombosis was removed completely. Compression was used for hemostasis. A retrospective analysis of our own single institution data with special focus of all operated patients was performed.

**Results/Outcome(s):** Between January and October 2016 622 Patients (418 male, 204 female, age 46 (16-84) years with external haemorrhoidal thrombosis were treated. 35 (6%) patients were lost. In 568 (91%) patients conservative management was successful. 19 (3%) patients had persistent symptoms after conservative therapy and received an outpatient surgical treatment. Postoperatively 7 patients suffered by recurrent pain and were treated again by Diclofenac. 1 patient experienced postoperative hemorrhage.

**Conclusions/Discussion:** In nearly all cases conservative management was successful for the treatment of external haemorrhoidal thrombosis and surgery was indicated only in the minority of cases. Despite our positive experiences further studies are needed to establish an algorithm for the treatment of this frequent proctological disease.

## PREEMPTIVE ANALGESIA IN ANORECTAL SURGERY.

p95

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**Purpose/Background:** Postoperative pain continues to be a frequent cause for delayed discharge following outpatient procedures, including patients undergoing ARS. Both central and peripheral pain receptor sensitization are thought to contribute to postoperative pain. Blocking these receptors and preempting sensitization prevents the hyperalgesic response leading to lower pain medication requirements. This has been shown in orthopedic, urologic, and gynecologic surgery, but in few studies of patients undergoing ARS. We conducted a double-blind, randomized placebo-controlled trial to evaluate the effectiveness of preemptive analgesia in decreasing postoperative pain.

**Methods/Interventions:** We randomized patients undergoing outpatient ARS (anal fistula repairs, anal sphincterotomy, hemorrhoidectomy, or anal condyloma excision) to treatment or placebo. The treatment group received oral acetaminophen and gabapentin preoperatively as well as intravenous ketamine and dexamethasone intraoperatively prior to incision. The control group received a oral placebo, and no ketamine or dexamethasone. Procedures were conducted under monitored anesthesia care with local anesthesia. Subjects were discharged on scheduled acetaminophen/ibuprofen with hydromorphone as needed for severe pain. Patients rated their pain from 0-10 immediately prior to discharge from PACU, at 8 hours, 24 hours and then at 24 hour increments until postoperative day 7. Daily medication diary and side effect profiles were recorded. Grant: ASCRS LPG 097

**Results/Outcome(s):** We enrolled 75 patients to date. Due to patient withdrawal, screen failures, and loss to followup 47 patients were analyzed (26 in the PEA group and 21 in the control group). In 24 patients data are not evaluable due to patient withdrawal from the study, screen failures, incomplete patient compliance, and lost to follow up. Four patients had incomplete data sets. There were no statistically significant differences in pain at any of the time points, analgesic consumption, or symptoms experienced. There were trends towards better pain control in PACU and at 8 hours postoperatively in the experimental group ( $p=0.10$  and  $p=0.06$ , respectively). The mean pain rating over the 7 days for the experimental group was 2.0 and 1.9 for the control group. Medication related side effects were rare and similar for both groups (1.5% vs 1.5%,  $p=0.44$ ). We did not find any benefit for PEA after stratifying by individual surgical procedure.

**Conclusions/Discussion:** Pain control was excellent with both groups throughout the study. The placebo group experienced minimal pain, therefore there was little

opportunity for PEA to improve outcomes. Subgroup analysis may have failed to identify benefit in more painful anorectal procedures, such as hemorrhoidectomy, due to type II error. Preemptive analgesia is not associated with any increase in perioperative complications and may be useful in lowering early postoperative pain in patients undergoing significantly painful anorectal surgery.

## FIBRIN GLUE IMPROVES RESULTS OF ENDORECTAL ADVANCEMENT FLAP FOR THE TREATMENT OF TRANSPHINCTERIC FISTULA.

P96

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**Purpose/Background:** Anal fistula is a complex problem treated by colon and rectal surgeons. Treatment options include endorectal advancement flap, fistulotomy, ligation of internal fistula tract, House anoplasty, cutting seton, and others, with varying percentages of recurrence. The ability to preserve fecal continence while treating the fistula is paramount, therefore sphincter preservation is optimal. This review was undertaken to examine the addition of fibrin glue to endorectal advancement flap as a way to decrease recurrence.

**Methods/Interventions:** From 2011 to 2016, we looked at 6 surgeons' treatment of anal fistula using endorectal advancement flap at a single institution. Patients ranged in age from 20 to 83 with a mean age of 48 years. We had 76 patients who underwent 81 advancement flaps. The patients who had 2 procedures were counted as 2 separate individuals; therefore all calculations are based off 81 patients. The mean body mass index was 29.5, with a range of 17.8 to 47.6. The mean length of follow up was 1 year, with a range of 0 - 5.2 years.

**Results/Outcome(s):** Fifty-nine patients were female (73%), 22 were male (27%). Eleven patients had inflammatory bowel disease (14%) (including crohn's disease, ulcerative colitis, and general inflammatory bowel disease), whereas 70 patients did not have an inflammatory bowel disease (IBD) diagnosis (86%). Fifty-five patients underwent endorectal advancement flap with fibrin glue placement (68%), 26 underwent endorectal advancement flap without fibrin glue placement (32%). Fourteen of 81 patients (17%) were active daily smokers. One patient (1.2%) was diabetic. Of the 81 procedures, 23 (28%) patients had fistula recurrence. Of the 55 patients who had fibrin glue placement, 11 (20%) had recurrence. Of the 26 patients without fibrin glue placement, 12 (46%) had recurrence. One of 14 smokers had a recurrence (7%). The mean time to recurrence was 5.9 months, with fibrin glue recurrence at 5.7 months and without fibrin glue recurrence at 6 months. Six (55%) of the 11 patients with IBD had recurrence. Nine of the IBD patients (82%) had initial

fibrin glue placement and 2 (18%) did not. Four of the 9 IBD patients with fibrin glue placement had recurrence (44%), while both of the non-fibrin glue fistulas recurred (100%).

**Conclusions/Discussion:** Fibrin glue decreased the recurrence rate when used in addition to endorectal advancement flap. We did not have enough diabetic patients to infer an effect. Smoking did not appear to cause higher recurrence. Patients with IBD had higher recurrence rates than the general population, however this rate was improved with the addition of fibrin glue. Based on this study, we feel that the addition of fibrin glue to endorectal advancement flap decreases the recurrence rate and improves the likelihood of successful treatment. Further studies are needed to include a larger sample size, have randomization, and look into the effect of debridement of the track.

#### WHAT IMPACT DOES HIGH-RESOLUTION ANOSCOPY HAVE AFTER ANAL CONDYLOMA TREATMENT?

P97

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**Purpose/Background:** There is an increased incidence of human papillomavirus infection as well as anal condylomas. At the same time, it is frequent the reappearance of warts after treatment. This recurrence might be related to the persistence of non-visible lesions. The use of high-resolution anoscopy (HRA) would allow to identify persistent lesions that could not be detected on standard anoscopy. The objective of this study was to evaluate the impact of HRA in the early detection of not recognized persistent lesions after primary clearance.

**Methods/Interventions:** A retrospective study based on a prospective collected database was performed. All patients who underwent anal condyloma treatment between January 2012 and December 2015 were included. Primary clearance was defined as 1 month without evidence of perianal and intra-anal condyloma on either standard anoscopy or HRA. The severity of condylomatosis was assessed according to the Silvera Index. The results of both examination methods were compared.

**Results/Outcome(s):** From the analyzed period of time a total of 186 patients were treated. Seventy five had both examinations performed and were included for the analysis. Fifty one (68 %) patients were men. Of those, 47 (92 %) were men who have sex with men (MSM). The average age was 35 +/- 12 years. 25 (33 %) patients were HIV +, and 46 (61 %) practiced receptive anal sex. The age of sexual initiation was 19 +/- 5 years and the mean number of sexual partners was 20 (1-200). 30 (40 %) patients practiced polygamy in the last year. The location

of the warts were: 27 (36%) perianal; 31 (41%) intra-anal; 17 (23%) in both areas. According to the Silvera index, the severity of condylomatosis was: 26 (35%) minimal; 41 (54%) moderate; and 8 (11%) extensive. 47 (63%) were treated with clinician-applied topical agents (90% trichloroacetic acid +/- 25% podophyllin) and 28 (37%) with electrofulguration. Primary clearance was confirmed in 46 patients (61%) after the standard anoscopy. From those, HRA had the same findings only in 27 (36 %) patients. From the 19 HRA new positive findings the biopsies showed: 14 (73%) unspecific inflammatory process; 4 (22%) viral warts without dysplasia; and 1 (5%) anal intraepithelial neoplasia (AIN I). In the 29 (39%) patients where standard anoscopy showed persistent lesions, HRA had the same findings and the biopsies showed: 2 (7%) unspecific inflammatory process; 14 (48%) viral warts without dysplasia; 1 (3%) anal intraepithelial neoplasia (AIN I); 2 (7%) AIN II; and 10 (35%) AIN III.

**Conclusions/Discussion:** Although the use of HRA identify a low number of persistent lesions after a primary clearance of warts, these findings are clinically relevant. For that reason, it might be recommended its routine use.

#### TREND IN SURGICAL MANAGEMENT OF FISTULAS-IN-ANO.

P98

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**Purpose/Background:** Fistula-in-ano is a long standing condition with literature describing its treatment dating back to Hippocrates. Despite thousands of years of information, there is still a variety of treatment options with limited data to support one option over the others. However, trends over time have shown an increase in the number of procedures with a decrease in fecal incontinence as a result of interventions. Treatment options range from fistulotomy to advancement flaps, plugs and glues, and even ligation of intersphincteric fistula tract (LIFT). Many centers have described their experience and results with one particular treatment. At our institution, we attempted to review our patient population over a five year time period and trend our practices with the hopes of elucidating information which may guide our future treatment to improve patient care.

**Methods/Interventions:** Retrospective chart review of the University office and hospital records regarding patient demographics, presenting symptoms, fistula characteristics, treatments, post-operative symptoms, complications, and hospital length of stay.

**Results/Outcome(s):** Out of 170 patients identified from ICD codes of patients undergoing fistula in ano treatment, 118 patients had complete records which we reviewed. The average patient was 43.8 years old and male (70.4%) with a BMI of 28.9. The most common

presenting symptoms were pain (90.7%), drainage (80.5%) and abscess (69.5%). Over half the patients underwent more than 1 surgery to treat their fistula in ano, 38.9% had complicated fistulous tracts, and the majority of patients underwent at least a seton placement (51.7%) or fistulotomy (70%). Of the patients who underwent more than 1 treatment, the definitive treatment which healed their fistula in ano was fistulotomy (58.5%). We further reviewed the data by dividing the 5 years into 2 time intervals comparing patient treated in 2009-2011 to those treated in 2012-2014. Table 1 demonstrates that during both time periods, a wide variety of treatment options were still being used with a potential increase in LIFT procedures. We further examined the treatment of fistula in ano in Crohn's patients (18). Most patients had more than 1 surgery and the most common procedure was seton placement (61.1%), followed by fistulotomy (27.8%).

**Conclusions/Discussion:** Our data reflects the diverse treatment options for fistula in ano that are demonstrated in the literature with a possible trend towards more seton placement and LIFT procedures for definitive treatment. While LIFT is our preferred treatment option in the appropriate patient, as it allows for better preservation of continence after intervention, our data reflects the increase in the number of procedures available that we hope will provide better results and decrease post-operative complications.

#### CLINICAL AND CT CHARACTERISTICS OF SUPRALEVATOR ANORECTAL ABSCESSSES IN 22 PATIENTS.

p99

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**Purpose/Background:** This article focuses on clinical characteristics, computed tomography (CT) findings and the precise anatomic classification of supralelevator abscesses (SLA) required for their definitive treatment.

**Methods/Interventions:** Twenty-two patients were followed in a prospective database over a ten-year period (2007-2016). All patients underwent surgical and

computed tomographic evaluation of the supralelevator infection. Abscesses were classified based on the primary site of infection. Presenting symptoms, external signs, imaging findings and outcomes were reviewed.

**Results/Outcome(s):** The majority of patients were male (86%) with a ratio of 6:1 (M:F). All 22 patients had cryptoglandular disease. External examination was unrevealing in 50% of patients. CT demonstrated rim-enhancing fluids collections (100%), lateral deviation of the rectum (86%), and soft tissue gas (77%) as the most frequent findings. The distribution by anatomic classification was SLA I (32%), SLA II (18%), SLA III (36%) and SLA IV (14%). The deep post anal space was the primary site of infection in 46% of cases. Two patients (9%) required re-intervention because the deep postanal space was not identified as the primary site of infection and treated accordingly.

**Conclusions/Discussion:** Supralelevator abscesses benefit from preoperative multi-plane reconstruction imaging for appropriate surgical intervention. Males are considerably often affected and many patients present with a paucity of clinical signs. Nearly half of the cryptoglandular abscesses involved the deep post anal space as the primary site. Failure to recognize involvement of this space is the most common cause of recurrent or persistent infection. The classification system and treatment algorithm is defined.

#### OUTCOME AFTER LIFT/BIOLIFT PROCEDURES.

P100

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**Purpose/Background:** The surgical management of anal fistula is in state of evolution. However, the principle of complex fistula remains the same: treat sepsis, preserve sphincter function and prevent recurrence. LIFT (ligation of intersphincteric tract) and BIOLIFT which augments LIFT procedure with a bioprosthetic mesh has seen growing interest in recent years. This study evaluates outcomes of patients undergoing LIFT/BIOLIFT for repair of complex anal fistulae.

**Methods/Interventions:** This study is a two-center retrospective review of a prospectively collected database.

#### P98 Definitive Treatment by Time Period and in Crohn's Patients

	2009-2011	2012-2014	Crohn's Patients
Seton	9.5%	15%	61.1%
Fistulectomy	2.4%	0	0
Fistulotomy	69%	57.6%	27.7%
Glue	0	0	0
Plug	0	0	0
Advancement Flap	0	1.5%	0
LIFT	19.1%	25.8%	11.1%

Study was conducted at Royal Prince Alfred Hospital and Concord Repatriation General Hospital in Sydney, Australia from May 2009 to May 2016. Sixty seven patients were evaluated. Fifty-eight LIFTs and twenty BIOLIFTs were evaluated. Primary success is defined as successful healing from initial procedure while secondary success is successful healing after management of failure or recurrence.

**Results/Outcome(s):** The mean age of patients were 39 years and 3 months with twenty-nine patients being female (43.3%). Fifteen patients (22.3%) had previous perianal abscess, and 29 patients had previous operations for perianal fistulas with 26 patients (38.9%) having seton and 3 patients (4.5%) having fistula plugs. Ninety five percent of the fistulas treated with LIFT/BIOLIFT were transsphincteric, with 77.2% being high transsphincteric. Half of the fistula (50.8%) were located anteriorly, 38.9% located posteriorly in midline and 10.2% located in lateral position. Preoperative anal manometry studies showed five patients (7.4%) had low resting pressure (mean: 25.3 mmHg), and three patients (4.5%) had low squeeze pressures (mean: 55.3 mmHg). The median final followup was 36.7 weeks (range: 7.1 - 234.2 weeks). Primary success rate was 61.5%, and additional procedures were required in 40.2% of patients. The median time to failure/recurrence was 17 weeks (range: 1 - 160 weeks). The LIFT had higher initial success rate than BIOLIFT however did not reach statistical significance (60.7% vs 33.3%,  $p=0.061$ ). Anterior fistula had lower primary success rate than fistula located elsewhere (41.9% vs 77.7%,  $p=0.006$ ). Amongst patients who needed additional procedure after initial failed LIFT/BIOLIFT, 53.8% required incision and drainage of perianal abscess, 50% required seton, 53.8% required fistulotomy, and 30.8% had redo-BIOLIFT procedure. Secondary success rate was 92.3%. There was no postoperative incontinence.

**Conclusions/Discussion:** LIFT is a procedure that can be performed safely in a technically demanding cohort of patients with complex fistulas without the added risk of causing incontinence. Failure/recurrence after initial operation is high, however they are amenable to repeat procedures with high rate of success in subsequent operations. Anterior fistulas have a higher rate of failure and surprisingly use of BIOLIFT as opposed to LIFT in the initial operation had higher rate of failure.

## OSTOMY USAGE FOR COLORECTAL TRAUMA IN WOUNDED WARRIORS: CHARACTERISTICS OF COMBAT-RELATED STOMA CREATION.

P101

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**Purpose/Background:** Much has been learned about combat-related trauma management during the modern conflicts in Iraq and Afghanistan. However few reports describe the use of diverting ostomy in severely wounded combat casualties. While the loop colostomy, as compared to end colostomy or any ileostomy, has been advocated for in combat trauma literature due to its relative ease of reversal, many factors go into the decision of which diverting procedure to perform. We examine patterns of ostomy usage in a large series of combat trauma patients.

**Methods/Interventions:** We performed a retrospective review of combat casualties injured in Operation Iraqi Freedom (OIF) or Operation Enduring Freedom (OEF, Afghanistan) and treated at our continental U.S. (CONUS) military treatment facility from 2003-2014. All patients who underwent ostomy formation as part of their treatment were included. Clinical characteristics including the indication for the ostomy, whether damage control laparotomy (DCL) was performed, injury severity scores (ISS), associated injuries, and the type of ostomy created were recorded. Comparisons were made between patients who underwent loop colostomy, end-colostomy, and ileostomy.

**Results/Outcome(s):** We identified 104 patients who had ostomies created during the study time period. End colostomies were used in 76.0% of patients, loop colostomies in 16.3%, and end ileostomies 7.7%. Indications for stoma included colon injury in 45.2% of patients, rectal injury in 26.9%, fecal diversion for perineal wounds in 23.1% and anal sphincter injury in 3.7%. Management with end colostomies predominated for all indications, though rectal injuries were more likely than any other indication to be diverted via loop colostomy (table 1). Mean ISS for all patients was 36.3 and did not identify the type of stoma created. However, for patients that underwent a DCL, end colostomies made up 81% of stomas created

**P101 Table 1: Indications for Diversion and Type of Ostomy Created**

	End Colostomy	End Ileostomy	Loop Colostomy	Total
Anal Sphincter Injury	4	0	0	4
Colon Injury	38	8	1	47
Fecal Diversion for Wounds	21	0	4	25
Rectum Injury	16	0	12	28
Total	79	8	17	104

compared to patients who did not undergo DCL where end colostomies made up only 58% of stomas ( $p=0.0012$ ).

**Conclusions/Discussion:** Lessons learned from our series of combat casualties managed with ostomies should improve our understanding of the role for diverting stoma in the severely wounded, both in the context of initial management of combat injuries as well as expectations for eventual ostomy reversal surgery. To our knowledge, this is the largest series to analyze combat-related stomas and the factors that contribute to their use. End colostomy was the procedure of choice for all indications for diversion investigated and the only method of diversion for anal sphincter injury in our cohort. End colostomy was the predominant ostomy selected in the DCL setting. Further research is ongoing to examine the long term outcomes for this unique group of patients and further guide the use and management of combat trauma stomas.

#### MORTALITY-BASED CLOSTRIDIUM DIFFICILE INFECTION SCORE USING A VALIDATED CLINICAL PREDICTION TOOL.

P102

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**Purpose/Background:** Treatment guidelines for *Clostridium difficile* infection (CDI) are limited by a lack of widely accepted Clinical Prediction Tools (CPT). While clinical variables have been identified which correlate with mortality in patients with CDI, a widely accepted, validated score system has yet to emerge. The aim of this study was to develop a mortality based CDI score to evaluate the risk of mortality based on a validated CPT.

**Methods/Interventions:** A retrospective chart review was performed on 655 inpatients with CDI at a tertiary teaching hospital. Our group has previously published five predictors of mortality in patients with CDI. Using these previously identified metrics, we employed univariate and multivariate analysis and internally validated this CPT based scoring system using bootstrap analysis.

**Results/Outcome(s):** All five variables were found to be predictors of mortality in this study population. The odds ratios were 2.42 for age greater than 60, 4.11 for use of vasopressors, 3.23 for creatinine greater than 1.4, 4.53

for use of steroids, and 4.12 for an albumin of less than or equal to 3. Based on this data, risk stratification based on number of risk factors identified at time of diagnosis into mild (0-1), moderate (2-3) and severe (4-5) CDI score. These groups were found to have in-hospital mortalities of 1.06, 6.71, and 39.9%, respectively. These results were confirmed to be internally valid with bootstrap analysis.

**Conclusions/Discussion:** Based on these data we have created a CDI score based on an internally validated CPT. The predicted mortalities associated with this CDI score will help to optimize management of these challenging patients. Utilization of this CDI score will identify patients who would most benefit from expeditious surgical intervention, and conversely which patient population may be safely monitored for clinical deterioration or change in CDI score.

#### ACUTE DIVERTICULITIS IN THE ELDERLY POPULATION. DOES AGE MATTER?

P103

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**Purpose/Background:** Diverticulitis remains a prevalent disease, especially in the elderly population. It has been established that elderly patients suffer more complications compared to their younger peers after surgical treatment of diverticulitis. However, the presentation still remains variable. The purpose of this study was to assess the severity of presenting symptoms and surgical management of diverticulitis in elderly patients who require operative intervention.

**Methods/Interventions:** We identified all patients with acute diverticulitis (ICD9 code: 562.11) from 2005 to 2012 through the ACS – NSQIP database. The study population was divided into two groups based on age, by using age of 75 as a cutoff. Patient demographics, severity of disease and need for emergency operation were compared between the two groups.

**Results/Outcome(s):** A total of 23,749 patients met our inclusion criteria, out of which 11.8 % ( $n = 2,805$ ) were 75 years or older. The elderly group was more likely to present with severe systemic disease ( $ASA \geq 3$ , 74.2 % vs. 32 %,  $p < 0.001$ ), sepsis or septic shock (19 % vs. 8.3 %,

**P102 Predictors of Mortality**

Variable	Odds Ratio	C.I. (Lower)	C. I. (Upper)
Age < 60	2.42	1.33	4.40
Vasopressor	4.11	2.06	8.21
Creatinine < or = 1.4	3.23	1.87	5.56
Steroids	4.53	2.55	8.04
Albumin < or = 3	4.12	2.27	7.47

C.I.: Confidence Interval

p < 0.001) and require emergency operation (33 % vs. 14.6 %, p < 0.001). Intra-operatively, the presence of dirty field (40.7 % vs. 20.2 %, p < 0.001) and the need for colostomy (43.4 % vs. 19.4 %, p < 0.001) were significantly higher in the elderly population.

**Conclusions/Discussion:** Elderly patients with acute diverticulitis are more likely to present with severe systemic disease, require emergency operation and colostomy creation compared to their younger peers. Early identification and surgical treatment of the disease may lead to less emergency operations and better outcomes in this population.

**A META-ANALYSIS COMPARING POSTERIOR COMPONENT SEPARATION (TRANSVERSUS ABDOMINUS RELEASE) WITH ANTERIOR COMPONENT SEPARATION IN THE REPAIR OF MIDLINE VENTRAL/INCISIONAL HERNIAS.**

P104

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**Purpose/Background:** Posterior component separation and transversus abdominus muscle release (PCS) is rapidly becoming the technique of choice for local myofascial advancement in complex ventral hernia repair. This study aims to compare the outcomes of posterior component separation with the more established anterior component separation (ACS) technique.

**Methods/Interventions:** Analysis was conducted according to PRISMA guidelines. A systematic search of the MEDLINE, EMBASE and pubmed databases was performed using the search term “component separation”. Studies reporting exclusively on midline ventral and incisional hernia repair utilising component separation techniques were reviewed. Studies describing PCS were selected and compared to matched studies describing ACS. Meta-analysis was used to compare outcomes between the two-pooled groups.

**Results/Outcome(s):** Seven studies describing 281 cases of PCS for midline incisional hernia using a retromuscular mesh placement were identified. Thirteen comparable

studies describing 686 cases of ACS and retromuscular mesh placement were identified from the same search. No randomised trials were identified. Pooled and comparative analysis results can be found in Table 1. Pooled analysis demonstrated a hernia recurrence rate of 5.7% (3.0-8.5) for PCS and 9.3% (5.4-13.3) for ACS. Comparative analysis demonstrated no significant difference between hernia recurrence rate (p=0.14). The use of bridging mesh was not significantly reduced by the use of PCS (3.1%) when compared to ACS (5.4%) (p=0.43). No significant difference was found in wound complication rates between the two techniques; wound complications ‘all’ 31.0% PCS vs 30.9% ACS (p=0.98), ‘superficial’ 10.9% PCS vs 17.4% ACS (p=0.11) and ‘deep’ 9.5% PCS vs 7.2% ACS (p=0.32). The two groups were found to have a comparable rate of reoperation 3.8% (0.1-7.2) for PCS versus 5.1% (2.4-7.8) for ACS (p=0.58). The post-operative length of stay was also comparable; 7.7 days (5.2-10.2) for PCS and 6.6 (5.1-8.1) for ACS (p=0.44).

**Conclusions/Discussion:** These data suggest PCS has comparable outcomes for hernia recurrence, wound complications and re-operation versus ACS. This analysis is limited by the lack of comparative studies and heterogeneity in the ACS group.

**SUCCESSFUL USE OF EXTRACELLULAR MATRIX PLUGS IN THE PERCUTANEOUS MANAGEMENT OF ENTEROCUTANEOUS FISTULAS.**

P105

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**Purpose/Background:** Enterocutaneous fistulae (ECF) continue to present a difficult and protracted clinical problem with significant morbidity and mortality. Numerous percutaneous methods have been proposed as intermediary treatment modalities between non-operative and surgical management. This study aims to review use of percutaneously placed extracellular matrix plugs (ECM) in management of ECF while identifying characteristics that may portend fistula closure.

**P104 Table 1: A meta-analysis comparing PCS with ACS across a range of outcomes.**

Outcome	PCS			ACS			Comparison		
	Studies	Pooled (%)	CI (95%)	Studies	Pooled (%)	CI (95%)	Difference (%)	Pooled (%)	CI (95%)
Hernia recurrence	7	5.7	3.0-8.5	13	9.3	5.4-13.3	-3.6	-8.4-1.2	0.14
Bridging mesh	6	3.1	0.0-7.2	13	5.4	1.7-9.1	-2.2	-7.7-3.3	0.43
Wound complications (all)	6	31.0	23.4-38.5	11	30.9	25.0-36.8	0.1	-9.4-9.7	0.98
Wound complications (superficial)	7	10.9	7.3-14.5	10	17.4	10.4-24.5	-6.5	-14.4-1.4	0.11
Wound complications (deep)	7	9.5	6.0-13.0	10	7.2	4.0-10.3	2.4	-2.3-7.0	0.32
Re-operation	5	3.8	0.4-7.3	10	5.1	2.4-7.8	-1.2	-5.6-3.1	0.58
Length of stay	4	7.7	5.2-10.2	6	6.6	5.1-8.1	1.5	-1.8-4.1	0.44



**Methods/Interventions:** A retrospective chart review of patients with ECF who underwent treatment with ECM between 2000-2014 was conducted. Each fistula was considered an individual case for analysis. The primary outcome was successful ECF closure. Categorical variables were compared using Pearson's correlation and continuous variables with a 2-sample t-test.

**Results/Outcome(s):** 36 patients with 40 ECF met inclusion criteria. The median age was 57.5 (IQR: 47.5-64.5). 55% were male and 80% were Caucasian. The overall ECF closure rate was 33% (n=13). There was no significant difference in closure based on age, race, gender, ECF duration, prior radiation, steroid use, tract length, treatment attempts (range 1-5), or number of plugs used. A higher rate of closure was seen in gastric fistula (5/7, 71%) versus small bowel (2/15, 13%) or large bowel fistula (6/10, 60%) ( $p=0.015$ ), ECF associated with prior G-tube sites (5/6, 83%) ( $p=0.017$ ), and in patients with BMI >25 ( $p=0.085$ ). Total parenteral nutrition (TPN) use ( $p=0.052$ ) or history of inflammatory bowel disease (IBD) ( $p=0.045$ ) were associated with lower closure rates.

**Conclusions/Discussion:** Our data suggest that percutaneous ECM is a viable option for intermediary management of ECF. Overweight patients (BMI >25), gastric fistulae, enteral nutrition, and absence of IBD showed higher closure rates in our study population.

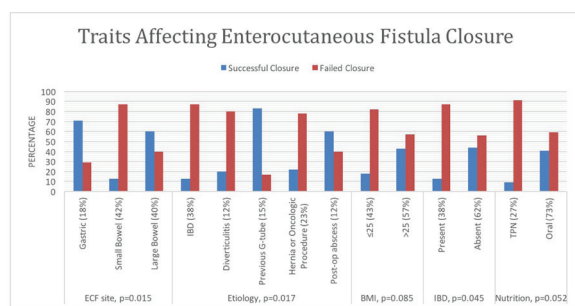


Figure 1. Patient and enterocutaneous fistula (ECF) traits that significantly affected successful closure rates when treated with extracellular matrix (ECM) plugs.

## TIME TO REEVALUATE COLONOSCOPY AGE CUTOFF? ADENOMAS MORE COMMON IN ELDERLY THAN THOUGHT.

P106

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**Purpose/Background:** Colorectal cancer is most frequently diagnosed between the ages of 65 to 74 years. The U.S. Preventive Services Task Force and the American Society of Colon and Rectal Surgeons currently recommend screening for colorectal cancer using colonoscopy beginning at age 50 years and continuing until age 75 years, with screening for patients aged 76 to 85 years based on individual patient health and prior screening history. Referrals to colorectal surgery for newly diagnosed colorectal cancer patients aged 80 years and older are not uncommon. However, data on adenoma prevalence and detection in this age group is sparse. We sought to investigate if adenoma prevalence continues to increase with age, and whether extending criteria for colorectal cancer screening could allow older individuals access to potentially life extending procedures.

**Methods/Interventions:** The EMR of a large multi-specialty clinic that serves one million people in the central Illinois region was queried from January 2015 through October 2016. Inclusion criteria were age 50 or greater and colonoscopy performed for screening. Exclusion criteria were age less than 50, and any history of adenomatous polyps or personal history of colorectal cancer.

**Results/Outcome(s):** The cohort consisted of 5,762 patients; 54.2% were male. The average age was 60 (SD = 8). One or more adenomas were detected in 46.3% of the population; a sessile serrated adenoma (SSA) was detected in 6.5% of the population. Cochran-Armitage Test for Trend was used to identify a trend in the adenoma detection rate with increasing age. Adenoma detection rate rose significantly with increasing age (50-59, 60-69, 70-79, and 80-90;  $p=0.0023$ ). This trend was consistent for both males and females ( $p=0.0307$  and  $p=0.0104$ ,

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	Age 50-59 (N=2979)		Age 60-69 (N=2046)		Age 70-79 (N=687)		Age 80-90 (N=50)		
Adenoma	Number	%	Number	%	Number	%	Number	%	p-value
Total	1334	44.8	958	46.9	345	50.2	29	58.0	0.0023
Males (54.2%)	619	39.4	471	41.2	166	43.7	16	59.3	0.0307
Females (45.8%)	711	50.7	486	54	179	58.3	13	56.5	0.0104
		$p<0.0001$		$p<0.0001$		$p=0.0002$		$p=1.0$	
SSA	Number	%	Number	%	Number	%	Number	%	p-value
Total	191	6.4	137	6.7	46	6.7	3	6	0.7455
Males (54.2%)	94	6.0	75	6.6	26	6.8	1	3.7	0.5757
Females (45.8%)	97	6.9	62	6.9	20	6.5	2	8.7	0.9920

respectively). There was a significant association between adenoma detection and gender with females having a greater proportion of adenomas ( $p < 0.0001$ ). This association was significant throughout each age group except for age 80-90 ( $p < 0.001$ ). There was no significant trend seen in SSA rates with increasing age category for overall rate or male and female separately ( $p = 0.7455$ ,  $p = 0.5757$  and  $p = 0.992$ , respectively).

**Conclusions/Discussion:** Our study found a statistically significant increasing adenoma detection rate in both genders through age 79, with a trend of continued increased adenomas after age 80. We also found that women in these age groups had a higher risk for adenoma than men of the same age. These findings suggest that the current recommendation of ending routine screening after age 75 deserves re-evaluation. Additionally, the finding of significantly higher adenoma rates in women as compared to men is counter to current literature and deserves further investigation.

#### A POPULATION-BASED ANALYSIS OF SMALL BOWEL GASTROINTESTINAL TUMORS (GIST) SHOWS A SHIFT TO EARLIER STAGE AT DIAGNOSIS: ANALYSIS OF THE SEER DATABASE.

P107

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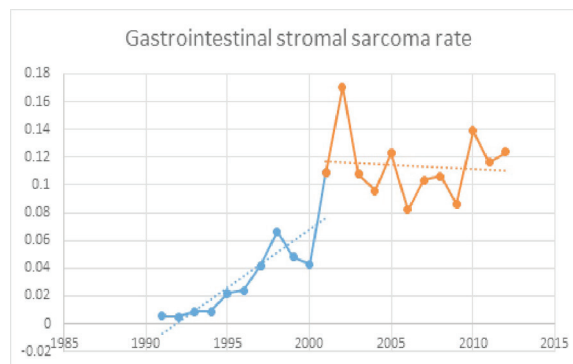
**Purpose/Background:** Since Hirota et al distinguished features of gastrointestinal tumors (GIST) in 1998, previous studies evaluating GISTs included other small bowel tumors, potentially overestimating the incidence. We aim to find the true incidence of small bowel GISTs from the SEER database, which specifically codes GISTs since 2001.

**Methods/Interventions:** From the SEER database (2001 – 2013), patients with small bowel GISTs were identified. Incidence rates and trends over time in the designated time period were calculated. Kaplan-Meier and cox regression test were used to compare survivals. Trends over time based on frequencies were calculated using the percent change (PC) and annual percent change (APC).

**Results/Outcome(s):** 1170 patients were diagnosed with small bowel GIST from 2001 – 2013. Median age was 60 years with more male (57.4%) patients. The most common stage was localized (58%) GISTs and the median size was 6 cm. The overall incidence of GIST in the USA was 1.5/1,000,000 persons, the annual- and percent changes were -0.78 and -8.97, showing a declining trend. There was a declining incidence seen in males (APC = -1.5, PC = -6.18) but increasing trend in females (APC = 0.15, PC = 15.7). Other races had significantly decreased incidence from 2001 to 2013 (APC = -7.54,  $p < 0.05$ ) while incidence in white patients was 0.101 (APC = 0.44,

$p = ns$ ). The incidence of localized stage GISTs is increasing (annual rate ratio [ARR] 2001 = 0.86 and 2013 = 1.11, 95% CI 0.69 – 1.70) while that of regional GIST incidence is declining (annual rate ratio compared to 2001 = 1.76 and 2013 = 1.13 95% CI 0.44 – 2.45). The incidence of GISTs in the jejunum has increased (ARR was 2001 = 0.55 and 2013 = 0.76 95% CI 0.3822 – 1.3823) while that in the duodenum (ARR was 2001 = 1.25 and 2013 = 0.97 95% CI 0.49 – 1.76) and ileum (ARR was 2001 = 1.68 and 2013 = 0.94 95% CI 0.36 – 2.07) is declining. Overall survival for localized and regional stage GISTs was similar. Using the same codes, the incidence of GIST prior to 2001 showed a 7 fold increase in the incidence from 1991-2001 and a declining trend after 2001. The median survival of patient was 148, 126, and 69 months for localized, regional, and distant GISTs from 2001 – 2013, respectively while it was 121, 111, and 19 months from 1991 – 2000, respectively.

**Conclusions/Discussion:** Incidence of small bowel GISTs in the US has seen a modest decline since 2001 with a greater proportion of patients diagnosed at an earlier stage likely due to the influence of newer imaging and endoscopic technology. Further, localized and regional GISTs have similar survival in the era of imatinib (post-2002).



Incidence of GIST before and after 2001

#### WOUND PROTECTORS IN REDUCING SURGICAL SITE INFECTIONS IN COLORECTAL SURGERY: AN UPDATED META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS.

P108

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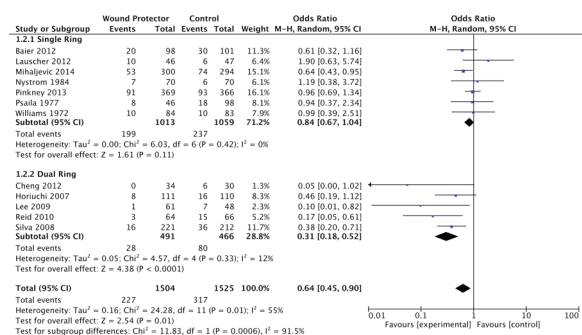
**Purpose/Background:** Surgical site infection (SSI) is a common complication in colorectal surgery, affecting up to 25% of patients. SSIs increase length of stay, incur increased costs to the healthcare system, and contribute to postoperative morbidity and mortality. Wound protection devices (or “wound retractors”) have been increasingly used in the past few decades in the effort to reduce SSI rates. We performed an updated meta-analysis to

determine if the use of wound protectors reduces the incidence of SSIs in colorectal surgery.

**Methods/Interventions:** MEDLINE and EMBASE databases were searched between 1946 and 2016. Randomized controlled trials comparing SSI rates in wound protector vs. no wound protector in colorectal surgery were included. The Odds Ratio was calculated for the primary outcome. We used random effects modelling to account for clinical heterogeneity. Subgroup analysis was conducted comparing single ring vs. dual ring wound protectors.

**Results/Outcome(s):** Twelve RCTs with 544 participants were included in the meta-analysis. There was a significant decrease in the odds of developing SSI in wound protector group (OR 0.64, 95%CI 0.45 – 0.90,  $P < 0.01$ ,  $I^2 = 55\%$ ). Seven studies used single ring wound protectors, and the remaining 5 studies used dual ring wound protectors. There was subgroup effect ( $P = 0.01$ ) with dual ring wound protectors associated with significantly lower incidence of SSIs (OR 0.31, 95%CI 0.18 – 0.52,  $P < 0.0001$ ,  $I^2 = 12\%$ ), which was not appreciated in the single ring wound protector group (OR 0.84, 95%CI 0.67 – 1.04,  $P = 0.11$ ,  $I^2 = 0\%$ ). Only one study included laparoscopic surgery, not sufficient for subgroup analysis. Three studies had high risk of bias in at least one category. The GRADE quality of evidence was moderate.

**Conclusions/Discussion:** Our updated meta-analysis provides the best available evidence for the use of wound protectors in preventing SSIs in colorectal procedures. Wound protector use is associated with decreased odds of developing SSI in patients undergoing colorectal surgery. Based on our subgroup results, dual ring wound retractors are associated with lower odds of developing SSI, while this effect is not appreciated in the single ring wound retractor group. Further evidence is required to delineate the role of wound protectors in laparoscopic surgery and potential complications of wound protector use.



## RESULTS OF COMBINED ENDOSCOPIC LAPAROSCOPIC POLYPECTOMY.

P109

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**Purpose/Background:** All patients selected for CELP were analyzed from a prospectively maintained single institution database. In all cases an outpatient colonoscopy showed benign pathology for colon polyps unamenable for conventional snare polypectomy. CELP was performed in general anaesthesia in lithotomy position as CO<sub>2</sub> colonoscopy. A follow-up colonoscopy was performed between 3 and 9 months after CELP.

**Methods/Interventions:** All patients selected for CELP were analyzed from a prospectively maintained single institution database. In all cases an outpatient colonoscopy showed benign pathology for colon polyps unamenable for conventional snare polypectomy. CELP was performed in general anaesthesia in lithotomy position as CO<sub>2</sub> colonoscopy. A follow-up colonoscopy was performed between 3 and 9 months after CELP.

**Results/Outcome(s):** Between December 2014 und October 2016 26 patients underwent CELP, age  $61 \pm 14$  years; 9 male, 17 female; follow up:  $478 \pm 292$  days. Polyp location: Coecum: 6, C. ascendens: 8, hepatic flexure: 1, C. transversum: 5, C. sigmoideum: 6. In 24 (92%) cases CELP was successful, polyp size 1,7 (1.2 – 2.8) cm, operation time 87 (55 – 96) min, mean hospital stay  $3 \pm 1$  days. In 2 (8%) cases laparoscopic segmental colon resection was performed because of technical difficulties. In all cases no major complications occurred. No carcinomas were detected in postoperative pathology. In 7 (29%, 24 pat.) a further polypectomy was necessary during follow-up colonoscopy. In 1 (4%) patient an adenocarcinoma was detected and a subsequent colon resection was performed. In 16 (67%) patients no polyp was found during control examination.

**Conclusions/Discussion:** CELP is a safe treatment option for large polyps or those, who are difficult to remove but short term control colonoscopies are necessary, respecting the possible risk of recurrence. In addition a longer follow-up is mandatory.

## DOES EXTRAPERITONEAL STOMA FORMATION REDUCE THE INCIDENCE OF PARASTOMAL HERNIA?

P110

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**Purpose/Background:** Parastomal hernia is a common problem with multiple previously identified risk factors. The aim of this study was to assess potential risk factors

in the development of parastomal hernia in patients who underwent transperitoneal or extraperitoneal stoma formation.

**Methods/Interventions:** A retrospective medical record review of all patients who underwent end ostomy at a single institution from 2008 to 2015 was performed. Patients under 18 years, those who died within 30 days, or those with a urinary stoma alone were excluded. Each new ostomy creation was classified as a separate unit of analysis. Parastomal hernia was defined by either its presence on review of computed tomography (CT) imaging or by clinical documentation in a post-operative physical exam. All post-operative CT scans were reviewed by the study investigators. All clinic encounters with the operative surgeon as well as the patient's last encounter with any physician were reviewed for clinical documentation. The study was approved by our IRB.

**Results/Outcome(s):** The records of 236 end ostomies in 204 unique procedures were reviewed. Over half of the patients were female (59%). The average age was 56.7 (SD 15.2) years and the average body mass index (BMI) was 26.6 (SD 6.9). Thirty-six (18%) patients were wheelchair bound. The most common indication for surgery was a functional bowel disorder. The majority (72%) of stomas were performed in an elective setting and 25 (11%) were created laparoscopically. Post-operative CT scans at a median of 10.6 months (interquartile range 1.6-27.4) from surgery were available to review in 178 (74%) of cases. Overall, 50 parastomal hernias (21.2%) were found at a median follow up of 11.4 months (interquartile range 4.1-28.0). Fourteen (28%) of the hernias were identified

by physical examination and 22 (44%) on the original CT report. Forty-five (90%) of the hernias were identified on CT review. Seven hernias (14%) were repaired. No parastomal hernias were identified in 17 patients with an extraperitoneal stoma (0% vs. 22.8%;  $p=0.03$ ) at a median follow up of 11.9 (interquartile range 2.4-27.3) months. Female sex, BMI 25-35, and transperitoneal stoma were significantly associated with an increased risk of parastomal hernia (table).

**Conclusions/Discussion:** A significant proportion of parastomal hernias were not clinically detected by physical exam documentation in our medical record review. In our experience, extraperitoneal stomas are associated with a very low parastomal hernia rate at short term follow up. Several previously reported risk factors for parastomal hernia were not significant in this cohort, especially in patients who underwent extraperitoneal stoma.

#### SINGLE INCISION LAPAROSCOPIC SURGERY TOTAL ABDOMINAL COLECTOMY AND TOTAL PROCTOCOLECTOMY WITH ILEAL POUCH-ANAL ANASTOMOSIS: A REASONABLE APPROACH FOR COMPLEX SURGERY.

P111

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**Purpose/Background:** SILS colectomy is often considered an option only for right colectomies or "ideal" surgical candidates. We have performed SILS for patients requiring

#### P110

Risk factor	n (% of total)	Parastomal hernias (% of subgroup)	p-value
Male	93 (39.4%)	12 (12.9%)	$p = 0.01^*$
Female	143 (60.6%)	38 (26.6%)	
BMI < 18 or $\geq 35$	134 (56.8%)	18 (13.4%)	$p = 0.001^*$
BMI 25-35	102 (43.2%)	32 (31.4%)	
Steroids	15 (6.4%)	4 (26.7%)	$p = 0.53$
No steroids	221 (93.6%)	46 (20.8%)	
Immunosuppression	48 (20.3%)	10 (20.8%)	$p = 1.00$
No immunosuppression	187 (79.2%)	40 (21.4%)	
Prior hernia	26 (11.0%)	9 (34.6%)	$p = 0.12$
No prior hernia	210 (89.0%)	41 (19.5%)	
Transverse colostomy	33 (14.0%)	11 (33.3%)	$p = 0.10$
Other ostomy	203 (86.0%)	39 (19.2%)	
Transperitoneal stoma	219 (92.8%)	50 (22.8%)	$p = 0.03^*$
Extraperitoneal stoma	17 (7.2%)	0 (0%)	
Colostomy/urostomy	218 (92.4%)	43 (19.7%)	$p = 0.07$
Ileostomy	18 (7.6%)	7 (38.9%)	
Surgical site infection	32 (14.0%)	8 (25.0%)	$p = 0.64$
No surgical site infection	203 (86.0%)	42 (20.6%)	

TAC and TPC-IPAA since 2010. However, research regarding SILS's feasibility for TAC and TPC-IPAA is scarce and outcome analysis is needed.

**Methods/Interventions:** Between 2/2010 and 7/2016, 35 patients underwent SILS TAC (n=20) or TPC-IPAA (n=15) with data prospectively maintained in a database. Unfavorable patients' characteristics were defined as previous abdominal surgery, BMI $\geq$ 30, and/or ASA $\geq$ III. Outcomes were analyzed regarding diagnosis, pre-, peri- and post-operative considerations.

**Results/Outcome(s):** SILS TAC or TPC was performed for 35 patients with diagnosis of UC (N=24), FAP (N=4), Colonic inertia (N=4), Pan-diverticulitis (N=2) and Crohn's colitis (N=1). There were 15 men and 20 women. Mean age was 48 years (21-79). Mean BMI was 25 kg/m<sup>2</sup> (16.8-38.0), 11% (4/35) with BMI  $\geq$ 30. 60% (21/35) had at least one unfavorable characteristic. 17% had previous abdominal surgery. 49% had ASA  $\geq$ III. 37% had 1 unfavorable factor, 14% had 2 unfavorable factors and 8.5% had 3 unfavorable factors. Mean EBL was 206cc (25-1500). Mean incision was 1.5 cm. There were no mortalities. There were no conversions to open surgeries. SILS completion rate was 83%. Overall, laparoscopic conversion rate was 17% (6/35): 8.5% for SILS+1 and 8.5% for multi-port laparoscopy. Between SILS TAC and TPC, no difference was shown in conversion rate requiring 1 additional laparoscopic port (10% vs 7%, p=0.72). There was a higher, though non-significant, conversion rate to multiport in TPC compared to TAC (20% vs 0%, p=0.061). Days to BM was shorter in TAC (2.2 vs 3.8, p=0.049). A similar trend was observed in time to flatus (2 vs 3.4, p=0.074), clears (2.1 vs 2.7, p=0.43) and LR diet (4 vs 6.4, p=0.19). Length of hospital stay for TAC was 7 (mode; range 4-19) and 7 (mode; range 4-88) for TPC. Intraop morbidity was 2.8% (1/35): intraabdominal bleeding. Postop morbidity was 22% (8/35): 2 anastomotic leak/pelvic abscess (5.7%), 2 ileus, 1 urinary retention, 1 postop transfusion, 1 RP bleed after dialysis, 1 high ileostomy output.

**Conclusions/Discussion:** Our study refutes the notion that SILS colorectal surgery should only be done for right colectomies and in "ideal" surgical candidates. Complex surgery (SILS TAC+TPC) was performed with no mortality or open conversion, low intraop morbidity and notably a low anastomotic leak/pelvic abscess rate. While this study suffers from potential selection bias that 60% were "unfavorable" surgical candidates, it demonstrates the efficacy of SILS in the most complex colorectal cases.

## INCIDENCE OF ANASTOMOTIC LEAK IN ELECTIVE HIGH ANTERIOR RESECTION IN DIVERTICULAR DISEASE VS NEOPLASIA.

P112

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**Purpose/Background:** Interval colectomy for diverticulitis has been suggested as a means to prevent further attacks although recently this recommendation has come under scrutiny. Studies have demonstrated increased morbidity and mortality when comparing colectomy for diverticular disease with neoplasia; however, there is a paucity of literature comparing the incidence of anastomotic leak between resections for diverticular disease and neoplasia in the elective setting. We aim to compare the incidence of anastomotic leak in open or laparoscopic high anterior resections between diverticular disease and neoplasia.

**Methods/Interventions:** Consecutive patients presenting to Fremantle Hospital, Fiona Stanley Hospital and St. John of God Hospital, Murdoch for an elective high anterior resection were identified from two prospective databases for the period between August 2007 and August 2016. Clinical records were reviewed. Included patients had an elective laparoscopic or open anterior resection with an anastomosis above the peritoneal reflection for the indication of either diverticular disease or neoplasia; patients were excluded if they had a covering stoma or more than one anastomosis. The diagnosis of anastomotic leak was established on radiology and or the requirement of a therapeutic intervention within 30 days of the operation. Leaks were graded according to classification proposed by the International Study Group of Rectal Cancer (Rahbari et al.)

**Results/Outcome(s):** Of the 534 patients identified, 340 had an anterior resection for neoplasia and 194 had a resection for diverticular disease; age (mean 66 vs 58, p 0.001), sex (male 58.8% vs 49.4%, p 0.038) were dissimilar whilst ASA (p 0.140), proportion performed laparoscopically (80% vs 84.5%, p 0.203), conversion rate to open (2.9% vs 2.4%, p 1.000) and consultant supervision (p 0.610) were similar. The incidence of anastomotic leak for the neoplasia and diverticular group was 4.7% (n = 16) and 7.2% (n = 14) respectively (p 0.244). Two in each group were treated with antibiotics only while all others were returned to theatre. Overall incidence of anastomotic leak was 5.6% (n = 30). Median length of stay was 5 days in the neoplasia group and 6 days in the diverticular group (p 0.304), in-hospital mortality was 0.03% (n=1) and 1.0% (n=2) respectively (p 0.300).

**Conclusions/Discussion:** Although there was an increased incidence of anastomotic leak in the diverticular group it was not statistically significant. Within the limitations of a retrospective review we conclude that the risk of

anastomotic leak in resection for diverticular disease does not preclude an elective operation.

### INTERNAL HERNIA VIA TRANSMESENTERIC DEFECT AFTER ROBOTIC LOW ANTERIOR RESECTION: A REPORT OF TWO CASES.

P113

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**Purpose/Background:** Robotic low anterior resection (rLAR) has become common practice for surgical treatment of low rectal cancers. As in laparoscopic colorectal surgery, the mesenteric defect remaining after colorectal resection and anastomosis is not routinely closed. Rarely, this defect has been reported as the etiology of an incarcerated small bowel obstruction. This is the first report of an internal hernia causing a small bowel obstruction after a robotic low anterior resection.

**Methods/Interventions:** Case #1 A 45 year old female, underwent a robotic low anterior resection with loop ileostomy for T3N0 rectal cancer, presented 10 weeks after surgery with clinical symptoms of a small bowel obstruction. Computed tomography illustrated signs of a closed loop obstruction and confirmed diagnosis. At laparotomy, small bowel loops were found to be herniated under the transverse colon through the colonic mesenteric defect into the left upper quadrant of the abdomen. Small bowel resection and anastomosis was performed for findings of strangulation (Figure 1). The mesocolic defect was not closed. The postoperative course was uneventful. Case #2 A 39 year old male, with history of a robotic low anterior resection and loop ileostomy for T3N0 rectal cancer, underwent elective reversal of ileostomy twelve weeks later. Postoperative course was complicated by an ileus, requiring nasogastric decompression and nothing per os regimen. Upon postoperative day four, the patient's clinical exam worsened and was concerning for a small bowel obstruction. Computed tomography illustrated signs of a closed loop obstruction and confirmed diagnosis. At laparotomy, small bowel loops including the ileostomy reversal anastomotic site were found to be herniated under the transverse colon through the colonic mesenteric defect. The bowel was reduced and viability was established. The mesocolic defect was not closed. The second postoperative course was uneventful.

**Results/Outcome(s):** There are few reports of internal-mesocolic herniation as a complication of laparoscopic colorectal surgery, a rare but morbid occurrence. Here we report the first two cases of an internal hernia after a robotic low anterior resection. Currently, there are no data to support how and whether the mesocolic defect should be closed in laparoscopic colorectal surgery. This report of two cases, illustrates the potential morbidity of internal hernias in robotic low anterior resections.

**Conclusions/Discussion:** Given the potential morbidity of internal hernias in all abdominal surgery, its rarity should not preclude its significance. This report of two distinct cases after a robotic low anterior resection should perhaps encourage more investigation on the management of mesocolic defects.



Figure 1. Image of gangrenous small bowel loop herniated through the mesocolic defect.

### PELVIC MRI IMAGING PARAMOUNT IN PREOPERATIVE PLANNING OF PREVIOUSLY DRAINED PRESACRAL CYSTIC NEOPLASM.

P114

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Mobile, AL

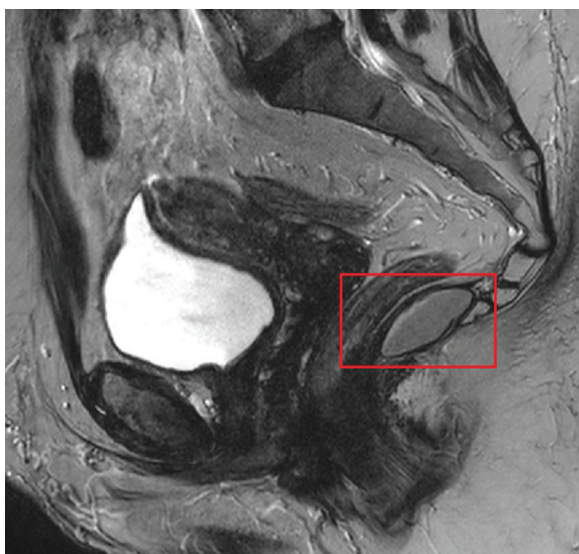
**Purpose/Background:** Presacral neoplasms are located between the sacrum and the rectum and are rarely encountered. They may be classified as congenital (2/3) versus acquired (1/3); benign versus malignant. Uhlig and Johnson further classified as: benign (epidermoid, dermoid, tailgut/ duplication cyst), neurogenic (chor-doma, neuroblastoma, meningocele), osseous (osteoma/ chondroma/sarcoma) and miscellaneous (GIST, carcinoid). Our patient is a 58-year-old female referred to our colorectal service for a presacral mass present for one year. Previously, she underwent transrectal aspiration with resultant infection requiring multiple incision and drainage procedures that ultimately resolved. About one year later, she re-presented without recurrence of perianal drainage or signs of infection, but with recurrent pelvic pain and pressure. Physical exam was unremarkable; however, MRI demonstrated a presacral cystic fluid collection measuring 4 cm by 1.5 cm as well as thickening of the left puborectalis and an indefinable intersphincteric fat plane from previous procedures. The mass abutted the anterior portion of the coccyx. The differential diagnosis included tail gut cyst, dermoid cyst and teratoma – all with malignant potential and obviating need for removal.

**Methods/Interventions:** Equipped with the MRI, we elected to proceed with a posterior operative approach with en bloc resection of the mass and coccyx. The MRI allowed us to accurately map out the required length of

our incision and appreciate the need for an en bloc coccygectomy. Additionally, we anticipated that the left-sided portion of the dissection would be difficult based on her history and the MRI findings, and indeed it was with cyst violation. Ultimately the cyst and coccyx were removed, and the cyst bed in the area without a clear plane seen on MRI was ablated with electrocautery. Flexible sigmoidoscopy verified that the rectum had not been violated.

**Results/Outcome(s):** Pathology revealed a benign squamous-lined cyst consistent with an epidermoid cyst. No dysplastic elements were identified. Six months from surgery the patient is doing very well without evidence of recurrence.

**Conclusions/Discussion:** Presacral masses are rare and often benign but do have malignant potential. The work-up of presacral masses should rarely involve a biopsy, especially transrectally, as this has the potential to seed a biopsy tract, cause infection, and compromise surgical planes, often necessitating a much more radical resection to obtain an R0 resection and increasing the chance of local recurrence. As our patient's cyst had been violated numerous times, both transrectally and transcutaneously, the definitive operative intervention was tedious, and the risk of cyst recurrence is high. This case demonstrates that imaging with MRI is important for characterizing the nature of a presacral mass and quite beneficial in developing a successful operative plan.



Presacral Cystic Fluid Collection measuring 4 cm x 1.5 cm on MRI.

## A CASE STUDY OF APPENDICEAL DIVERTICULUM PRESENTING AS A SUBMUCOSAL MASS.

P115

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**Purpose/Background:** Diverticulosis of the appendix is a rare pathologic entity. Of all appendectomies, the incidence is reported between 0.004% and 2.1%<sup>1,2</sup>. It was first described in the literature in 18935. Perforation rates as high as 66% have been reported, carrying an associated mortality rate 30% higher than acute appendicitis<sup>1</sup>. Complications like massive GI bleeding, abscesses, and peritoneal pseudomyxoma (in the case of malignancy) have also been reported<sup>1</sup>. We report a case of an appendiceal diverticulum presenting as an asymptomatic submucosal mass.

**Methods/Interventions:** This is the case of a 64 year old female who presented for a screening colonoscopy and was found to have a submucosal cecal mass at the time of her procedure. This submucosal mass was non-obstructing, and measured 2 cm. Colonoscopic biopsy results showed normal mucosa with submucosal lymphoid aggregates. In an effort to rule out malignancy and the possibility of sampling error, she underwent a laparoscopic ileocolic resection.

**Results/Outcome(s):** Final pathology determined this mass-like appearance was produced by a diverticulum distended with fecolith. The overlying mucosal changes were histologically benign hyperplastic mucosal lymphoid tissue at the base of the appendix. The immediate postoperative period was without complication and patient was discharged on postoperative day four. She was readmitted on postoperative day 21 for portal vein thrombosis. She didn't require any further surgeries, and was transitioned to therapeutic anticoagulation and was discharged hospital day 3.

**Conclusions/Discussion:** Appendiceal diverticula are rare entities often identified at the time of surgery for other indications. There is no indication that having a diverticulum is of itself an indication for surgery, however we must be cognoscente of its potential risks: diverticulitis, bleeding, abscess and/or perforation. If it harbors a malignancy it bears the standard risks association with colonic malignancy and should be treated as such. When the diagnosis is in doubt, surgical intervention is required.

## GIANT RECTAL ADENOMA: DOES SIZE MATTER?

P1316

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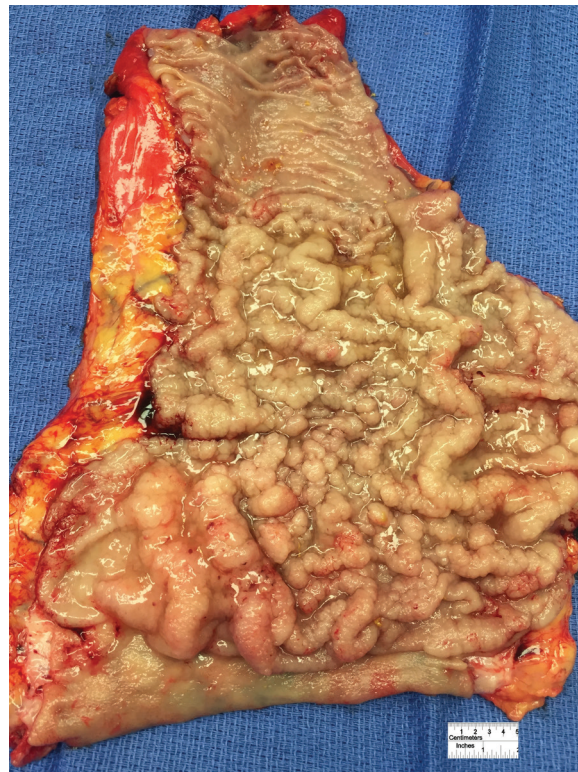
**Purpose/Background:** Giant rectal adenoma (GRA) is a unique disease of the rectum that can result in a quandary for diagnosis. GRAs can mimic large cancerous lesions or benign lipomas and can cause symptoms of obstruction or prolapse. Different pathology like giant rectal hamartomas have been described in Peutz-Jeghers syndrome. We performed a literature review and present a case of GRA.

**Methods/Interventions:** A 69 year old male, with no family history of colorectal cancer, presented with weight loss and diarrhea and was found to have a giant rectal polyp encompassing the rectum from 6-20 cm from the anal verge circumferentially. Given the size of the mass, pelvic MRI was performed and didn't reveal any invasion. Endoscopic biopsy showed tubulovillous adenoma and he underwent an open low anterior resection. Intraoperative evaluation of the specimen by pathology found the lesion to be consistent with a GRA. The patient did well post operatively without morbidity. He was found to have a 13.5 x 11 cm tubulovillous adenoma with focal intramucosal carcinoma with no evidence of lymphovascular or perineural invasion. 0/15 lymph nodes were positive resulting in a TisN0, stage 0 lesion.

**Results/Outcome(s):** GRAs mimic a wide array of rectal lesions and clinical features provide a tipping point towards benign or malignant a priori diagnosis. It is reported that over 70% of adenomas greater than 3.5cm in size are found to have a carcinomatous foci. Care must be taken in the work up, as these lesions may be harbingers of cancerous lesion or insights to syndromic patterns. GRAs are more common in patients with ulcerative colitis and are rarely found in children. They may present as intestinal obstruction, weight loss, and abdominal discomfort. Giant rectal polyps may be associated with syndromes including Peutz-Jeghers, Brill-Symmers disease, McKittrick-Wheelock syndrome, and Castleman's disease. Multiple surgical techniques have been reported for removal of these lesions based on location, size, and surgeon experience. Techniques include endoscopic excision, segmental surgical resection, and transanal endoscopic microsurgery (TEM). Transanal excision of lesions has been reported with up to 36% recurrence rates and up to 19% morbidity. However, in evaluation of 43 giant adenomas, Choi et al report successful en bloc removal of 100% of lesions excised by TEM. In lesions that are large and circumferential in nature, surgical resection should be performed. Total mesorectal excision for exceedingly large tumors due to familiarity with the technique and minimal morbidity is recommended.

**Conclusions/Discussion:** Rectal adenoma can progress into a flat giant form causing obstruction, diarrhea,

or abdominal pain. Preoperative studies must include endorectal ultrasound or pelvic MRI to evaluate for invasion. Care should be taken to evaluate for associated syndromes and malignant transformation of lesions. Surgical approach should be catered to patient morbidities, the location and size of lesion, and surgeon experience.



Giant rectal adenoma: circumferential 13.5 x 11 cm tubulovillous adenoma

## A CASE OF MIDGUT VOLVULUS ASSOCIATED WITH A JEJUNAL DIVERTICULUM.

P117

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**Purpose/Background:** Midgut volvulus in adults is a rare entity that may present with intermittent colicky abdominal pain mixed with completely asymptomatic episodes. This small bowel twist may result in complications of obstruction, ischemia, hemorrhage or perforation. With a midgut volvulus, complications may be life threatening and emergent surgical intervention is the mainstay of treatment. This current case involves an 80-year-old woman with intermittent abdominal pain with increasing severity and decreasing interval of time to presentation.

**Methods/Interventions:** A CAT scan revealed mesenteric swirling with possible internal hernia.

**Results/Outcome(s):** A diagnostic laparoscopy followed by laparotomy revealed a midgut volvulus, extensive adhesions involving the root of the mesentery and a large



jejunal diverticulum. The adhesions were lysed enabling untwisting of the bowel, allowing placement of the small bowel in the correct anatomic position and resection of the jejunal diverticulum.

**Conclusions/Discussion:** This is a rare case of midgut volvulus with intermittent abdominal pain, associated with jejunal diverticulum managed successfully. A midgut volvulus should be considered in the differential diagnosis of a patient who presents with a small bowel obstruction secondary to an internal hernia, especially when a swirl sign is present on CAT scan.



Open view of volvulized small bowel

### BILATERAL INTERNAL ILIAC ARTERY ANEURYSMS LEADING TO PARTIAL COLONIC OBSTRUCTION: A CASE REPORT.

P118

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**Purpose/Background:** Isolated iliac artery aneurysms (IAA) are uncommon, with an overall incidence of 0.03%. The incidence of IAA associated with an abdominal aortic aneurysm is higher.

**Methods/Interventions:** We present a case of a 74-year-old gentleman with bilateral fusiform aneurysmal dilation of his common and internal iliac arteries respectively. The left iliac aneurysm was ruptured represented by active bleeding adjacent to the left iliac aneurysm.

**Results/Outcome(s):** He underwent emergent endovascular stenting of the left common and left internal iliac arteries. The patient then developed a large bowel obstruction secondary to the right aneurysm and left hematoma, underwent an angiography which showed

the aneurysm extending from the right common iliac to proximal external iliac and internal iliac arteries. Stenting of the right common to the right external iliac artery with an extension into the internal iliac artery was done. The patient did well after the procedure and continued to have multiple bowel movements.

**Conclusions/Discussion:** Our described case is the only one to have undergone endovascular stenting to treat bilateral iliac aneurysms and describes the feasibility of endoscopic management of colonic obstruction.



CT Abdomen and Pelvis depicting the bilateral iliac aneurysms

### USE OF STENTING FOR OBSTRUCTING RECTAL CANCER AS A BRIDGE TO NEOADJUVANT THERAPY AND SURGERY: A CASE SERIES.

P119

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**Purpose/Background:** Self-expanding metal stents (SEMS) have been increasingly used as a bridge to surgery for colorectal cancer. Prospective studies have shown SEMS to be associated with lower complication rates, shorter hospital stay, and less definitive stoma placement when compared to traditional diverting colostomy for colon cancer. However, the role of SEMS in the management of obstructing rectal cancers as a bridge to neoadjuvant therapy and surgery has not been well defined, and published data is limited to a single case report with a positive outcome.

**Methods/Interventions:** A retrospective case series of 4 patients at a single institution with obstructing rectal cancer who received a SEMS as a bridge to neoadjuvant and surgical therapy.

**Results/Outcome(s):** Our patients were between the ages of 60 and 73 and found to have newly diagnosed, nearly obstructing mid to high rectal cancer on colonoscopy. The lesions were causing 75-99% obstruction of the bowel lumen at 7-15 cm from the anal verge. Pathology

from biopsy was positive for adenocarcinoma or high grade dysplasia. Staging CT showed no distant metastasis. All patients had SEMS placed successfully by an interventional endoscopist. They quickly started neoadjuvant therapy after stent placement (average 33 days) which they completed without a diverting stoma. The SEMS did have complications of anorectal pain one patient and fecal impaction in another patient. All patients were then able to proceed with definitive surgical therapy after completing neoadjuvant treatment, and all operations were successful curative local resections. Intra-operatively there was significant induration surrounding the SEMS as well as local perforation in 2 patients. Of the three patients with rectal anastomosis during their primary surgery, all developed anastomotic leaks managed with washout and drainage. Of our 4 patients, 1 is now anastomosed without diverting ostomy, 1 is a candidate for anastomosis but lost to follow up, and 2 have permanent colostomies.

**Conclusions/Discussion:** Without the availability of SEMS and the expertise required to place them in an emergent setting, all of our patients would have received initial diverting stomas. Initial surgery and diversion prior to neoadjuvant treatment is not ideal, as patients have to recover from surgery before initiating neoadjuvant therapy. The use of SEMS for obstructing rectal cancer allows the prompt initiation and successful completion of neoadjuvant therapy as a bridge to surgery. Patients were able to avoid general anesthesia, operative morbidity, and a stoma for a period of time. However, SEMS are not without complication and may compromise anastomotic integrity during resection. In our experience SEMS may be an effective alternative to diverting ostomy, but can lead to difficulties a surgeon should be aware of prior to use.

## TWO CASES OF OGILVIE SYNDROME (OS) PRESENTING AFTER STROKE.

P120

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Philadelphia, PA

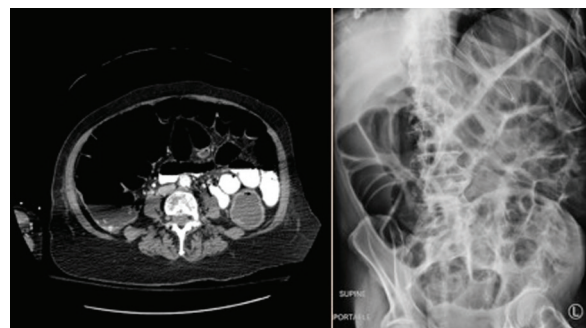
**Purpose/Background:** OS often presents with nausea, vomiting and abdominal pain, without detectable mechanical obstruction. OS is classically secondary to retroperitoneal manipulation. OS has been seen following stroke, thought to be due to autonomic dysfunction of the parasympathetic nervous system. This causes decreased bowel motility leading to fecal stasis and intestinal dilatation.

**Methods/Interventions:** Two cases of OS after stroke are detailed.

**Results/Outcome(s):** #1 A 78-year-old woman presented to an outside hospital (OSH) with acute hemorrhagic stroke. CT of the abdomen and pelvis revealed colonic distension with no evidence of mechanical obstruction. The patient then underwent a flexible sigmoidoscopy which resulted in 4L stool removal. She was

transferred to TJUH with worsening abdominal distension and pain without resolution. Her last bowel movement was before transfer. Her abdomen was severely distended and tender. There was no fecal impaction on digital rectal exam. She had numerous rectal tubes placed without resolution. Imaging showed increased colonic dilatation. A neostigmine bolus was given with no improvement. She had continued pain and distention with no flatus or bowel movements. Two days after the initial dose of neostigmine, a second dose was given with no improvement. Colonoscopic decompression was performed. The day after, she had no abdominal distension or tenderness and was better tolerating a liquid diet. A few days later she had not yet had a bowel movement, oral intake remained minimal and her abdominal distension worsened. The following week, she began to have flatus and bowel movements. #2 A 66-year-old man presented with a stroke. He developed severe abdominal distension. Abdominal X-rays revealed marked colonic and small bowel dilatation. Flexible sigmoidoscopy showed no evidence of mechanical obstruction. He had numerous rectal tubes placed without resolution. He continued to have persistent colon distension and received a bolus of neostigmine. Two days later, abdominal X-ray showed mild decrease in colonic dilatation. Later, a second dose of neostigmine was given with no improvement. Colonoscopic decompression was attempted but terminated due to concern for perforation. The following CT of the abdomen and pelvis revealed no perforation. The next day, abdominal X-ray noted decreased colonic dilatation.

**Conclusions/Discussion:** Due to autonomic dysfunction from stroke causing OS, standard medication management does not seem to be the appropriate first-line option. Boluses of neostigmine may not be strong enough in damaged bowel wall to overcome the dysfunction. Instead, beginning with a continuous infusion of neostigmine, a longer-acting acetylcholinesterase inhibitor or introduction of another mechanism of action may provide better relief due to prolonged exposure to the medications. It is also possible that colonic decompression creating decreased tension on the bowel wall before ischemia/perforation can occur may be a better initial treatment.



## INFLAMMATORY FIBROID POLYP: A RARE NEOPLASM OF THE COLON.

P121

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**Purpose/Background:** The inflammatory fibroid polyp (IFP) or Vanek's tumor is a rare gastrointestinal neoplasm. Predominantly located in the gastric antrum and small bowel, these benign lesions are characterized by a proliferation of spindle and stellate cells in a loose fibromyxoid stroma that contains abundant inflammatory cells and small blood vessels. Colonic IFP accounts for 4-7% of all IFP.

**Methods/Interventions:** We retrospectively identified a series of patients with IFP of the colon and performed a literature review of the presentation, characteristics, diagnosis, management and prognosis of these lesions.

**Results/Outcome(s):** Clinical symptoms are heterogeneous and dependent on the location and size of the tumor. IFPs can mimic other tumor and non-tumor processes of the gastrointestinal tract. Adequate preoperative assessment is essential in differentiating IFP from more aggressive gastrointestinal tumors. This pathology has excellent long-term prognosis with complete resection.

**Conclusions/Discussion:** IFP of the colon is an extremely rare neoplasm that can present in numerous ways, making them difficult to diagnose. Complete resection yields an excellent prognosis.

## RECURRENT RUQ PAIN MASQUERADING AN AN UNDERLYING COLON ADENOCARCINOMA-INDUCED INTUSSUSCEPTION.

P122

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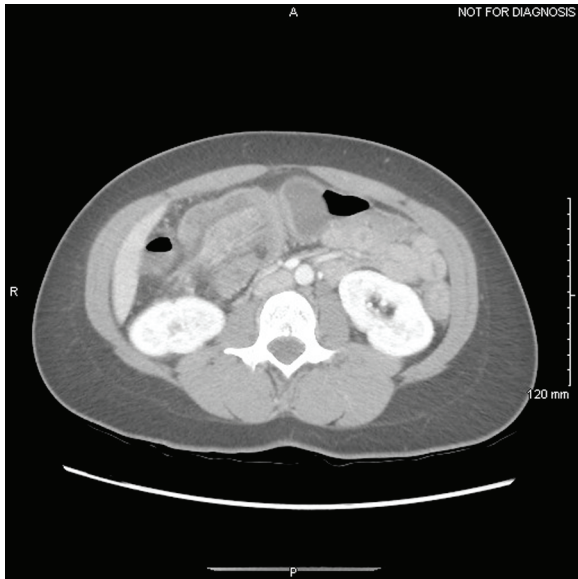
**Purpose/Background:** Adult intussusception is rare, less than 5% of cases of bowel intussusception. It most commonly presents with bowel obstruction. However, nonspecific abdominal pain presentation is typical. Unlike children in which the cause is usually idiopathic, adults have an underlying pathologic lesion in 80-90% of cases. Colonic intussusceptions have malignant leading points in up to 70% of the cases. Additionally, adenocarcinoma accounts for up to 30% of small bowel intussusception. Oncologic resection remains the optimal therapeutic option.

**Methods/Interventions:** A 39-year-old African-American female who presented with chronic, recurrent, intermittent, right upper quadrant abdominal pain over a five-month period. She is otherwise healthy. She had outpatient work up for biliary disease including an ultrasound of right upper quadrant of the abdomen (RUQ) which showed no evidence of gallstones. Subsequently,

a HIDA scan was performed and showed normal gallbladder ejection fractional. She then represented to the Emergency Department with recurrent symptoms but more intense. Over the last two days, she reported feeling food getting "stuck" in her stomach, lasting several minutes at a time, with pain relieved after bowel movement. She denied fevers, hematochezia, or hematemesis. A computed tomography (CT) scan of the abdomen/pelvis showed a colo-colonic intussusception at hepatic flexure. A Gastrograffin contrast enema showed a reduced intussusception but revealed irregular narrowing of the ascending colon concerning for colonic mass. Colonoscopy was performed after gentle bowel preparation and showed a friable, fungating mass in the ascending colon. Biopsies confirmed infiltrating colorectal adenocarcinoma with features of low-grade neoplasm.

**Results/Outcome(s):** The patient underwent laparoscopic extended right hemicolectomy with ilio-transverse colonic anastomosis. Final pathology showed ascending colon adenocarcinoma with angiolymphatic invasion and 1 out of 28 lymph nodes with metastatic disease consistent with T3, N1, M0. She subsequently had surveillance colonoscopy with no evidence of recurrence at four years postoperatively.

**Conclusions/Discussion:** Adults account for less than 5% of all cases of intussusception and the underlying etiology is usually pathologic such as Meckel's, adhesions, lymphoid hyperplasia, lipoma, leiomyoma, hemangioma or adenocarcinoma. The presentation is often nonspecific abdominal pain. Commonly, these patients present with obstructive symptoms. The typical presentation of currant jelly stool, episodic abdominal pain, and palpable sausage shape is usually not seen in adults. Diagnostic modalities include abdominal plain XRY, ultrasound, and CT scan which is most sensitive at 80% of cases. A high index of suspicion is critical in a patient with intermittent nonspecific abdominal pain and can help with establishing early diagnosis and prompt surgical intervention.



CT abdomen/pelvis showing intussusception in right upper quadrant

### COLONOSCOPIC ASSISTED TRANSANAL EXCISION OF NEARLY OBSTRUCTING LOW RECTAL POLYP.

P123

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**Purpose/Background:** Conventional transanal excision (TAE) has been limited to lesions up to 8 cm from the anal verge, at or below the first rectal valve of Houston, up to 3 cm in size, and occupying no more 40% of rectal circumference. The versatility offered by Transanal Endoscopic Microsurgery (TEM) or Transanal Minimally Invasive Surgery (TAMIS) systems provide techniques that allow for local resection of a wider range of endoscopically unresectable polyps or T1 lesions that are too large or distal for conventional TAE. TEM and TAMIS have their own significant associated costs and learning curves. We present a case report of a 59-year-old male who was referred to our practice with a large endoscopically unresectable polyp seen on his first screening colonoscopy. On flexible sigmoidoscopy the polyp was first seen 7cm from the anal verge, occupied 70% of the anterior wall on the first valve of Houston, sessile, without ulceration. On endorectal ultrasound the mass was 4cm long, lamina propria was intact, and no lymphadenopathy identified. The percentage of luminal occupancy was the only factor that would have excluded this mass from consideration of conventional TAE. It was reasoned however by the senior author that if the polypoid mass could be excised down to adequately see the circumferential margins of the lesion's base that a TAE could be performed.

**Methods/Interventions:** The patient was taken to operating room, placed under general anesthesia then positioned in left lateral decubitus position. The lesion was

so large it precluded adequate visualization with operative anoscope. Colonoscope with carbon dioxide insufflation was used to distend the rectal vault. Hot snare polypectomy was then done to pare down the exophytic elements of the sessile lesion without disturbing the base. After partial piecemeal polypectomy the patient was converted to jackknife prone position, then 5mm margins were demarcated and partial thickness TAE was performed in standard manner using needle tipped electrocautery. The resection encompassed 90% of the rectal wall and the operative site was only amenable to a partial transverse closure.

**Results/Outcome(s):** The postoperative clinical course was uncomplicated. No bleeding, minimal postoperative pain, no urinary retention. The patient was discharged home on the second post-operative day after precautionary observation. He followed up in clinic in 2 weeks without signs or symptoms of complications. Specimen pathology was positive for tubulovillous adenoma with high-grade dysplasia with proximal margin showing benign mucosa and submucosa and distal margin showing benign submucosa and focally adenomatous mucosa.

**Conclusions/Discussion:** For some distal (up to 8 cm from anal verge) space occupying lesions of the rectum that are too large for conventional TAE, colonoscopic assisted resection is a more cost efficient and easier modality for local resection than TEM or TAMIS.



### MULTIPLE PYOGENIC LIVER ABSCESSSES IN AN IMMUNOCOMPETENT PATIENT: AN ATYPICAL PRESENTATION OF COLON CANCER.

P124

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Torrance, CA

**Purpose/Background:** Pyogenic hepatic abscesses can develop from colon cancer, likely secondary to the tumor altering mucosal permeability, which results in

translocation of bacteria into the portal system. Most commonly these lesions arise in immunocompromised, usually diabetic, patients with either *Klebsiella pneumoniae* or *Streptococcus bovis* as the infectious agent. Conversely, we describe a rare case of a healthy and previously asymptomatic male diagnosed with multifocal colon cancer after presenting with numerous group C hemolytic streptococcus abscesses throughout his liver.

**Methods/Interventions:** Case review of a single patient who presented to our institution in 2014.

**Results/Outcome(s):** A 59-year-old male with no prior medical history presented to the emergency department febrile, tachycardic, and complaining of right upper quadrant abdominal pain. Laboratory values were significant for an elevated white blood cell count, liver function tests, and creatinine. Fluid resuscitation and antibiotics were given, and his symptoms improved. Computed tomographic (CT) scan revealed innumerable hepatic hypodensities consistent with metastases versus abscesses as well as thickening of the transverse colon (Figure 1). Further imaging with magnetic resonance imaging (MRI) and positron emission tomography scan (PET) was unable to differentiate the etiology of the hepatic lesions. Cultures were obtained by ultrasound-guided aspiration that grew group C beta hemolytic streptococcus, and concomitant core needle biopsy showed inflammation without evidence of malignancy. Colonoscopy revealed a large fungating mass in the transverse colon with sigmoid and rectosigmoid polyps. Pathology identified these as villous adenoma with dysplasia, well-differentiated adenocarcinoma, and carcinoma in-situ, respectively. No other infectious source was found after extensive work-up including a transthoracic echocardiogram. He had a total colectomy with partial proctectomy, ileorectal anastomosis, and liver biopsy. Final pathology showed invasive mucinous adenocarcinoma in the transverse colon and rectosigmoid lesions. Intramucosal adenocarcinoma was noted in the sigmoid polyp. Seven of fifty-five lymph nodes were positive for adenocarcinoma. The liver lesion was consistent with abscess, without evidence of metastatic tumor. Post-operatively the patient did well and was discharged without complications. At one-year follow-up, he had no evidence of recurrent or metastatic disease.

**Conclusions/Discussion:** Cryptogenic liver abscesses can be a harbinger of colon cancer in otherwise asymptomatic patients. It is currently recommended that patients with this presentation undergo screening colonoscopy, and our case underscores the importance of this recommendation, even if patients are immunocompetent and/or have unusual bacterial cultures.

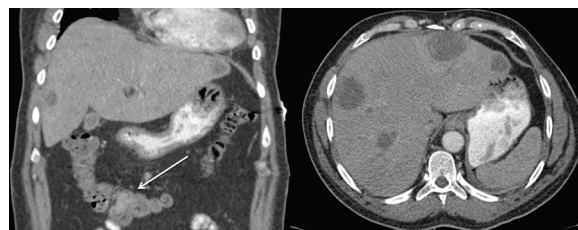


Figure 1. CT scan showing multiple hepatic low density lesions and thickening of the transverse colon (arrow)

### IMPACT OF BODY MASS INDEX AND OPERATIVE MODALITY ON OUTCOMES IN PATIENTS WITH ULCERATIVE COLITIS UNDERGOING TOTAL PROCTOCOLECTOMY WITH ILEAL POUCH-ANAL ANASTOMOSIS.

P125

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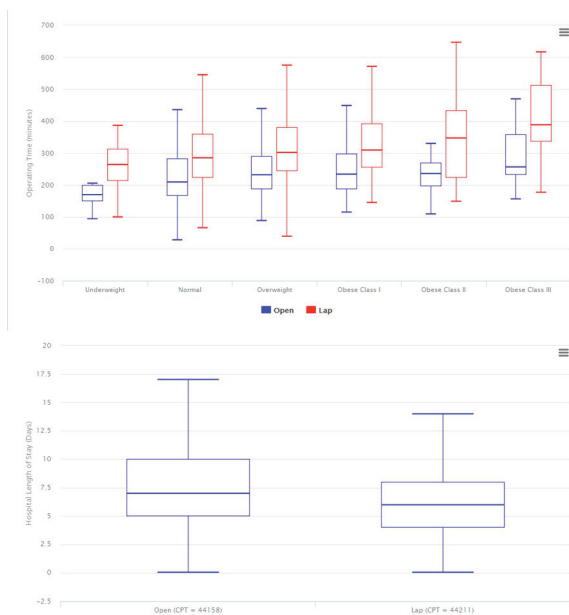
**Purpose/Background:** To evaluate the effect of patient BMI and operative modality (laparoscopic [LS] versus open [OS] surgery) on peri- and post-operative outcomes utilizing a standardized national patient database.

**Methods/Interventions:** Utilizing the ACS-NSQIP database from the years 2010-2014, all adult (>18 years old) patients diagnosed with Ulcerative Colitis (UC) who underwent non-emergent total proctocolectomy with ileal pouch anal anastomosis (TPC-IPAA) were analyzed. Demographic data were attained for all patients. Patients were separated into groups based on their BMI. These were Underweight (<18.5), Normal (18.5-24.9), Overweight (25-29.9), Obese Class (OC) 1 (30-34.9), OC-2 (35-39.9), and OC-3 (>40). LS and OS modalities were assessed in all patients. Operative time (OT) and length of stay (LOS) were assessed for all patients and compared among different BMI groups and operative modalities. Post-operative outcomes, including complications, re-operation, re-admission, and mortality were also analyzed between the different groups.

**Results/Outcome(s):** 1,518 adult patients with UC underwent non-emergent TPC-IPAA. 297 (19.6%) were classified as obese (BMI > 30). Median BMI was 25.5 (range 12.1-53.6). Median age was 41 years (range 18-89). 64% of patients underwent LS. Obese patients were less likely to undergo LS, with OC-3 patients having the lowest percent of LS (42%). Median LOS was not significantly impacted by BMI, but was significantly shorter in LS versus OS (6 vs 7 d,  $p<0.05$ ). Median OT was significantly impacted by BMI ( $p<0.05$ ), with OC-3 patients having the highest (342 min). OT was also significantly impacted by operative modality, with OS taking less time than LS (224 vs 297 min,  $p<0.05$ ). There were no significant differences in post-operative renal, DVT, or severe infectious complications among BMI groups. BMI did not significantly affect reoperation, readmission, or mortality

rates. Cardiopulmonary (CP) complications trended higher with elevated BMI ( $p=0.06$ ), as did wound complications ( $p=0.10$ ). There were no significant differences in post-operative renal, DVT, or severe infectious complications in OS vs LS. CP complications did trend higher in OS ( $p=0.13$ ). Post-op wound infections were significantly higher in OS than LS (21% vs 15%,  $p<0.05$ ). No significant differences in readmission, re-operation, or mortality were found.

**Conclusions/Discussion:** A significant portion of the patient population with UC undergoing TPC-IPAA is obese. BMI significantly impacted OT but not LOS. Post-operative complications were not significantly different across BMI groups, although higher BMI groups did trend towards higher rates of CP and wound complications. LS had significantly longer median OT and shorter LOS when compared to OS. OS was associated with higher wound complications. Further investigations into impact of BMI on post-operative outcomes are warranted.



## LOOP ILEOSTOMY CLOSURE AFTER LAPAROSCOPIC VS OPEN PELVIC POUCH PROCEDURE, IS THERE A DIFFERENCE IN OUTCOMES?

P126

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**Purpose/Background:** Loop ileostomies (LI) theoretically help prevent pelvic sepsis following creation of an ileoanal pouch (IPAA). However, reports suggest significant morbidity related to closure. A potential benefit of laparoscopic pouch surgery may be a more straightforward LI closure due to fewer adhesions. The aim of our study was to first assess the complication rate of ileostomy

closure, and to compare the complications of LI creation and closure after laparoscopic assisted versus open pelvic pouch procedures.

**Methods/Interventions:** We performed a matched pairs cohort study. 108 laparoscopic IPAA cases with loop ileostomies done between 1999 and 2015 were matched with 216 open IPAA cases for age, sex and BMI, for a total of 326 patients.

**Results/Outcome(s):** The cohorts were similar for age, sex, BMI, smoking and pre-operative hemoglobin level. The overall complication rate was low in both cohorts (lap 5,56%; open 8,33%,  $p=0.369$ ). Minor complications occurred in 1,85% of the laparoscopic cases vs 3,70% of the open cases ( $p=0.217$ ). 3,70% of the patients sustained a major complication in the laparoscopic group vs 4,63% in the open group ( $p=0.696$ ).

**Conclusions/Discussion:** This study is limited by its retrospective nature. There was no difference between the cohorts, but overall the complication rate for LI closure was low. LI closure is an operation with relatively low morbidity.

## NONSEPTIC COMPLICATIONS OF STAGED J-POUCH SURGERY FOR ULCERATIVE COLITIS DO NOT DELAY LOOP ILEOSTOMY REVERSAL.

P127

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**Purpose/Background:** In patients with ulcerative colitis, septic and non-septic complications of staged ileal pouch anal anastomosis (IPAA) surgery occur in 5-10% and 20-30% of patients, respectively. Septic complications have been shown to result in a delay in loop ileostomy reversal. The impact of non-septic complications on the interval to loop ileostomy reversal after staged IPAA is not clear. The aim of this study was to determine the impact of non-septic complications of IPAA surgery on short-term postoperative outcomes and the interval to loop ileostomy reversal in patients with ulcerative colitis.

**Methods/Interventions:** Single surgeon, tertiary referral center, retrospective study of consecutive proctocolectomy or completion proctectomy with j-pouch ileo-anal anastomosis and loop ileostomy operations for ulcerative colitis. Non-septic complications included any postoperative complication aside from generalized sepsis, pelvic sepsis/organ space SSI, or IPAA leak that occurred in the interval between the IPAA and ileostomy reversal operations. In all cases, the anticipated interval to loop ileostomy reversal was 10 – 12 weeks (70 – 84 days).

**Results/Outcome(s):** From 2013 to 2016, 29 cases, including 19 (65%) completion proctectomy with IPAA and loop ileostomy and 10 (35%) proctocolectomy with IPAA and loop ileostomy operations were performed. A minimally invasive approach was used in 8 (28%) of

patients. No patients experienced generalized sepsis, pelvic sepsis/organ space SSI, or anastomotic leak. Non-septic complications were diagnosed in a total of 17 (59%) of patients of which 13 (45%) patients occurred during the index admission and 4 (14%) of patients after discharge. The median number of complications per patients was 2 (1-4). The most common index admission complications were ileus (n=8, 30%), pouch hemorrhage (n=2, 7%), and urine retention (n=2, 7%) and led to unplanned reoperation (n=2, 7%) in both patients with pouch hemorrhage. Index admission length of stay for patients with and without complications were 7.6 ( $\pm$ 2.4) and 5 ( $\pm$ 1.2) days, respectively (p=0.02). A total of 10 readmissions for non-septic complications, including excessive pain (n=3), dehydration (n=2), small bowel obstruction (n=2), or other problems (n=3), were required for 7 (24%) patients. Reoperation during readmission was required for 1 (3%) patient with SBO. The interval to loop ileostomy reversal in patients with and without complications were 74 ( $\pm$  18) and 87 ( $\pm$  18) days, respectively. (p=.08)

**Conclusions/Discussion:** Postoperative non-septic complications occur in the majority of patients with UC who undergo staged IPAA. While reoperation and readmission are often required to manage these complications they do not result in delay in loop ileostomy reversal.

#### COMPARISON OF CLINICAL CHARACTERISTICS AND LONG-TERM OUTCOMES AFTER COMBINED TREATMENT OF PERIANAL CROHN'S DISEASE WITH AND WITHOUT PROCTITIS: RESULTS FROM A SINGLE INSTITUTION.

P128

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**Purpose/Background:** Proctitis is commonly seen among Perianal Crohn's disease(PCD) patients. The presence of proctitis is associated with a more disabling natural history, with increased treatment failure and proctectomy rate. Therefore, Present of proctitis is an indication for aggressive treatment. However, little is known about the underlying causes of this phenomenon. Recent data showed that combined Surgery and anti-TNFs treatment could offer promising outcomes for PCD. The long-term benefits of combined therapy specifically on PCD patients with proctitis is under-reported. The aim of this study was to compare clinical features and long-term outcomes after combined treatment between PCD patients with and without proctitis.

**Methods/Interventions:** Patients with PCD who received combined surgery and Infliximab treatment at our institution between June 2011 and October 2014 were reviewed retrospectively. The patients were divided into proctitis and non-proctitis group according to the presence of

proctitis. Clinical variables included age, gender, Montreal classification, subtypes of perianal disease, previous perianal surgery, CDAI, PDAI, CRP, ESR, platelet count, BMI and albumin. Outpatient follow-up was employed to evaluate the long-term outcomes of perianal disease. Student's t-test was used to analyze continuous variables; Fisher's exact test or Pearson's chi-square test was used for categorical variables.

**Results/Outcome(s):** There were 52 PCD patients included in our study, of which 30 patients had proctitis. Age, gender, behaviours of disease, subtypes of perianal disease, previous perianal procedure and PDAI were similar between two groups(P>0.05). The proctitis group tended to have more active disease(CDAI>150, 76.7% vs 36.4%, P= 0.003), higher rate of elevated CRP(83.3% vs 36.4%, P= 0.001)and ESR(80.0% vs 36.4%, P= 0.001), compared to non-proctitis group. Meanwhile, patients with proctitis were more likely to have low BMI(56.7% vs 27.3%, P= 0.035)and albumin(40.0% vs 9.1%, P= 0.013) than those without proctitis. After combined therapy, all patients were followed for a median of 28(8-52) months. The rate of healed, improved and unhealed perianal disease were 53.3%, 36.7%, 10% in proctitis group and 59.1%, 31.8%, 9.1% in non-proctitis group. There was no significant difference between two groups regarding the treatment outcomes(P>0.05).

**Conclusions/Discussion:** To our knowledge, this is the first study that has compared the difference between PCD patients with and without proctitis. PCD with proctitis were associated with higher rate of active disease and poor nutritional status. The overall severe systemic disease rather than local disease could be the potential factor for the poor prognosis of PCD patients with proctitis. Combined surgical and Infliximab treatment could render equivalent long-term outcomes for PCD patients with and without proctitis.

Clinical variables of perianal Crohn's disease with and without proctitis

	Proctitis (n=30)	Non-proctitis (n=22)	P-value
Age	28.5±8.5	27.1±9.9	0.588
Gender (%)			0.959
Male	23 (76.7)	17 (77.3)	
Perianal subtype (%)			0.985
Anal fistula	18 (60.0)	14 (63.6)	
Perianal abscess	10 (33.3)	6 (27.3)	
Rectovaginal fistula	1 (3.3)	1 (4.5)	
Non-fistulizing disease	1 (3.3)	1 (4.5)	
Previous perianal surgery	21 (70.0)	18 (81.8)	0.531
Montreal classification (%)			
Location			0.032
Ileal	3 (10.0)	9 (40.9)	0.009
Colonic	9 (30.0)	4 (18.2)	0.531
Ileocolonic	18 (60.0)	9 (40.9)	0.135
Behaviour			0.473
non-structuring, non-penetrating	22 (73.3)	18 (81.8)	
Structuring	8 (26.7)	4 (18.2)	
Penetrating	0 (0)	0 (0)	
CDAI			0.005
>150	23 (76.7)	8 (36.4)	
≤150	7 (23.3)	14 (63.6)	
PDAI			0.685
>4	22 (73.3)	15 (68.2)	
≤4	8 (26.7)	7 (31.8)	
CRP (mg/L)			0.001
>8	25 (83.3)	8 (36.4)	
≤8	5 (16.7)	14 (63.6)	
ESR (mm/H)			0.001
>20	24 (80.0)	8 (36.4)	
≤20	6 (20.0)	14 (63.6)	
PLT (10 <sup>9</sup> /L)			0.476
>300	11 (36.7)	6 (27.3)	
100-300	19 (63.3)	16 (72.7)	
BMI (kg/m <sup>2</sup> )			0.035
<18.5	17 (56.7)	6 (27.3)	
≥18.5	13 (43.3)	16 (72.7)	
albumin (g/L)			0.013
<35	12 (40.0)	2 (9.1)	
≥35	18 (60.0)	20 (90.9)	

centres currently offer a laparoscopic assisted approach for ileal pouch anal anastomosis, most studies have relatively small numbers. This study aimed to compare the outcomes of a large series of laparoscopic assisted IPAA with open IPAA in a single high volume institution.

**Methods/Interventions:** Patients with UC or FAP who underwent laparoscopic IPAA between 2001 and 2014 at our institution were selected and matched to open IPAA cases according to age, sex, and BMI. The primary outcome of anastomotic leak rate (indicated by clinical or radiologic documentation) was examined in the two groups. Secondary outcomes including wound infection, prolonged length of stay, and blood transfusion were also compared between the two groups. Chi-square and linear regression analysis was performed.

**Results/Outcome(s):** A total of 159 laparoscopic IPAA cases were matched with 159 open cases. Perioperative transfusions were significantly greater in the open group (0.103u v 0.348u, p=0.01). Complication rates including pouch leak, intra-abdominal abscess, wound infection, and pouch stricture were not found to be significantly different. Operative time was significantly longer for the laparoscopic group (6.38h vs 3.64h, p=0.01). However, the laparoscopic group was found to have less intra-operative blood loss (237.4ml vs 293.4ml, p=0.04). and a shorter post-operative length of stay (9.66d vs 11.30d, p=0.01).

**Conclusions/Discussion:** Laparoscopic IPAA offers the advantage of decreased hospital length stay. There was no increase in pouch leak or other complications. Laparoscopic IPAA may be at least comparable, to open IPAA.

**LAPAROSCOPIC EXPERIENCE IN ILEAL POUCH-ANAL ANASTOMOSIS AT A HIGH VOLUME CANADIAN INSTITUTION: A CASE MATCHED SERIES.**

P129

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**Purpose/Background:** Restorative proctocolectomy with ileal pouch-anal anastomosis (IPAA) is the preferred surgical treatment for ulcerative colitis (UC) and familial adenomatous polyposis (FAP) patients. Although many

**TREATMENT OF CHRONIC PERIANAL FISTULAS USING ADIPOSE-DERIVED STEM CELLS: A SINGLE INSTITUTION'S EXPERIENCE.**

P130

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**Purpose/Background:** Perianal fistulas can occur in up to 40% of patients with Crohn's disease. Many fistulas will be chronic in nature despite medical and surgical

**P129 Complications**

	Laparoscopic	Open	P-Value
Pouch Leak	5	6	0.759
Intra-abdominal Sepsis	4	8	0.248
Intra-abdominal Bleed	1	0	-
Wound Infection	8	11	0.491
Pouch Stricture	4	1	0.180
Poor Functional Result	1	1	1.000
Total Transfusions (units)	0.103	0.348	0.0085



treatment. Adipose-derived stem cells (ASCs) are a population of multipotent cells obtained from subcutaneous adipose tissue. ASCs have wound healing potential and can aid in healing chronic wounds. The purpose of this study was to evaluate the efficacy of autologous ASCs as an adjunct in healing intractable perianal fistulas in patients with Crohn's disease.

**Methods/Interventions:** Crohn's disease patients with perianal fistulas refractory to medical and surgical therapy were included. Surgical treatment including fistulotomy, seton placement, ligation, or flap closure was performed as indicated based on wound location and severity. Lipoaspirate was obtained intraoperatively via liposuction, then filtered and concentrated. The resulting lipoaspirate with a concentrated population of ASCs was injected into the tissue surrounding the fistula.

**Results/Outcome(s):** Five patients with Crohn's disease underwent 12 fat grafting procedures between December 2013 and October 2016. This included 4 females and 1 male, with median age of 39 years at first operation (range 36-45). Patients had Crohn's disease for a median of 14 years (range 9-32) and fistulas present for a median of 32 months (range 8-74). Lipoaspirate was obtained from the abdomen or thigh and median grafting volume was 12 ml (range 3-50). Outcomes are listed in Table 1. One patient required drainage of perianal abscess on postoperative day 7 but no other complications were observed.

**Conclusions/Discussion:** Chronic perianal fistulas secondary to Crohn's disease are difficult to treat and

often require multiple surgical procedures, many without successful closure. In 5 patients treated with ASCs, 2 achieved fistula closure and 2 achieved modest improvement with minimal side effects. Fat grafting with ASCs may be a useful adjunct to current therapies to improve tissue healing in patients with intractable perianal disease.

## WHAT IS THE ROLE OF ROBOTIC SURGERY IN ULCERATIVE COLITIS?

P131

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**Purpose/Background:** The surgical treatment of ulcerative colitis (UC) is challenging, not only because of difficult dissections in the pelvis, but also secondary to patient characteristics such as malnutrition, immunosuppressive therapy, and inflammatory tissues. All of these factors contribute to the difficulty in surgically treating UC, and make laparoscopy in this area even more intimidating. For these difficult laparoscopic cases, use of the robot may enable surgeons to better visualize planes, control hemorrhage and complete cases minimally invasively. We performed a retrospective review of total proctocolectomies and completion proctectomies with ileal pouch anal anastomosis (IPAA) for the definitive treatment of ulcerative colitis, in order to determine the efficacy and safety of the robot in this specific patient population.

**P130 Patient Outcomes**

Patient	Fistula location	Procedure #	Preoperative severity	Results
A	Pouch-vagina	1	3 mm diameter defect	Small but persistent
		2	<1mm defect, no tract	No fistula at 6 weeks
		3	Resolved	Grafting performed for perineal bulking and continued healing
B	Pouch-cutaneous	1	Large trans-sphincteric	Continued drainage, seton placed at 2 months
		2	Moderate trans-sphincteric	Continued drainage, modest improvement
		3	Small, distal	Modest improvement in size and drainage
		4	Superficial, 2 cm tract	Worsened and seton replaced at 2 months
C	Rectum-vagina	1	Large wound, 5-7 mm diameter defect	Smaller, drainage resolved at 2 months
		2	5 mm defect	Closed, no drainage at 2 months. Recurred at 3 months
		3	2 mm defect	No drainage at 2 weeks
D	Rectum-cutaneous	1	Large trans-sphincteric	No drainage at 4 months. Recurred at 6 months
E	Rectum-cutaneous	1	8-10 cm tract	Persistent due to uncontrolled Crohn's disease

**Methods/Interventions:** This is a retrospective review of robotic surgery performed at Rutgers RWJ for the treatment of ulcerative colitis from 2009-2016. Patient characteristics, perioperative outcomes, conversion rates and immediate post operative complications were evaluated.

**Results/Outcome(s):** Between 2009-2016 there were 36 attempted robotically assisted procedures for the surgical treatment of ulcerative colitis. 6 converted to open with a conversion rate of 16.6%. Reasons for conversion included inability to tolerate pneumoperitoneum, inadequate retraction, stapler malfunction and hemorrhage control. Out of the 30 completed robotically, 19 had total proctocolectomies with IPAA, 10 had completion proctocolectomies with IPAA, and 1 had a total abdominal colectomy with end ileostomy as a staged procedure. Average BMI was 25; average age was 43 years; 48% of patients were female and 52% were male; 69% had an ASA level of 2; 24% ASA 3; 7% ASA 1. Average OR time was 354 minutes. Average estimated blood loss (EBL) was 162 ml. Average length of stay was 6.5 days; average days to bowel function was 2.4. There were no anastomotic leaks. Immediate post operative complications included one patient with a missed small bowel injury requiring take back to the OR and small bowel resection; 4 patients with ileus; 1 small bowel obstruction; 1 wound infection; and 1 patient with urinary retention.

**Conclusions/Discussion:** Robotic proctocolectomy and completion proctectomy with ileal pouch anal anastomosis can be performed safely and effectively, with acceptable morbidity and conversion rates. Use of the robot may be particularly advantageous in the narrow pelvis where proctectomy is very difficult with traditional laparoscopic methods. Robotic surgery should be strongly considered for the surgical treatment of ulcerative colitis.

## SURGICAL OUTCOMES OF COLORECTAL CROHN'S DISEASE.

P132

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**Purpose/Background:** Crohn's disease (CD) exclusively affect the colon and rectum in 25% of cases. The objective of this study is to report the short and long-term surgical outcomes in a series of patients with isolated colorectal CD.

**Methods/Interventions:** Historical cohort. The inclusion criteria were patients operated for CD of colon and/or rectum between January 2003 and May 2016, at Hospital Clinico de la Universidad Catolica de Chile in Santiago, Chile. Patients with ileocecal involvement were excluded, as well as those with preoperative diagnosis of ulcerative colitis. Demographic data, pre and postoperative

pharmacological treatment, postoperative complications, re-intervention and mortality were analyzed. Long-term outcomes and the need for a new resective surgery were included. Follow-up was done reviewing the charts and contacting the patients. Descriptive statistics were performed using SPSS 22.0

**Results/Outcome(s):** 28 patients underwent surgery. Median age: 37.5 years (17-72). Fifteen patients were male. Involvement of the colon was present in 23 (82,1%) and of the colon and rectum in 5(17,8%). Fifteen (53,6%) patients presented perianal disease and 13 (46,4%) extra-intestinal disease. Twenty-seven patients were in medical treatment: 18 with steroids; 13 with immunosuppressors; 15 on 5-ASA and 11 on biologics. Elective surgery was performed in 22 (78,6%) patients. One or more of the following clinical conditions were the surgical indications: failure of medical treatment in 15 (30%), acute colitis in 12 (24%); nutritional impairment and anemia in 8 (16%); strictures in 5 (10%), fistulas in 3 (6%), perforation in 2 (4%). The procedures performed were: total colectomy plus end ileostomy in 13 (46,4%), proctocolectomy in 8 (28,6%); total abdominal colectomy plus ileorectal anastomosis in 4(14,3%) and segmental colectomy in 3 (10,7%). Sixteen patients had a laparoscopic approach. Major morbidity (Clavien-Dindo  $\geq$  III) was recorded in 5 (17,5%) cases, 4 of which needed reintervention. Hospital overall stay had a median of 18 days (5-78). There was no mortality. On long term follow up (median:55 months), 7 patients had second surgery on the bowel: 3 completion proctocolectomies, 3 ileorectal anastomosis and 1 one resection of terminal ileum for recurrence after a proctocolectomy. At present, on follow up of 27 of the 28 patients, 11(40,7%) patients have an end definitive ileostomy, 7 (25,9%) an ileorectal anastomosis; the other 8 patients currently have a temporary stoma. Twelve (44,4%) patients are on immunosuppressant, 5-ASA or biologics.

**Conclusions/Discussion:** In the present series, 17,5% of the patients presented major morbidity. One-fourth of the patients required a second resective operation. The majority needed an ileostomy, which was definitive in half of them.

## THE EFFECTIVENESS OF BIOLOGICS IN TREATING PERIANAL FISTULOUS CROHN'S DISEASE.

P133

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**Purpose/Background:** The introduction of biologics has enhanced the management of patients with perianal Crohn's disease (CD). Previous studies have reported fistula closure in 36-55% of patients treated with biologics over a median time of less than two years. This study

aimed to evaluate the effectiveness of biologics in treating patients with perianal fistulous CD over a longer time period.

**Methods/Interventions:** All patients with CD (ICD9 555.9) and anal fistulas (ICD9 565.1) treated at a single academic institution between 2005 and 2016 were identified from an internal database and included in this retrospective review. Patient demographics, medication use, number and type of fistula-related operations, baseline Crohn's disease activity index (CDAI) and perianal Crohn's disease activity index (PCDAI) scores were recorded. Patients treated with biologics were analyzed and the primary outcome was rate of fistula healing defined as closure of the external opening without drainage for a period of at least 3 months. Secondary outcomes were predictive factors for fistula healing and PCDAI score changes.

**Results/Outcome(s):** 79 patients were identified with perianal fistulous CD. 56 patients (71%) were treated with biologics and were followed for a median time of 4 (range, 0-12) years. Of these 56 patients, 19 (34%) healed their fistulas. 5 patients healed with biologics and setons alone and 14 patients healed after biologics and additional

surgery (6 sphincter-sparing fistula repairs, 5 fistulotomy, and 3 fecal diversion). Six patients subsequently developed recurrent fistulas, leaving 13 patients (23%) healed at the last follow-up. No analyzed factors were predictive of healing amongst patients treated with biologics (Table). There was a trend toward improvement in median PCDAI scores from baseline (11) to last follow-up (8) ( $p=0.06$ ).

**Conclusions/Discussion:** Anal fistulas in CD rarely heal with biologics and setons alone. Fair healing rates can be achieved with the use of biologics and additional surgical intervention, but outcomes deteriorate with longer follow-up. Biologics in combination with surgery remain the standard treatment for perianal fistulous CD; yet, therapeutic challenges remain.

**P133 Table: Characteristics of healers and non-healers**

	Healers (n=19)	Non-healers (n=37)	P value
<b>Age</b> (years)	35 (20-58)	32 (16-75)	0.65+
<b>Gender</b> (% female)	11 (58)	19 (51)	0.58*
<b>BMI</b> (kg/m <sup>2</sup> )	24 (15-36)	23 (15-54)	0.36+
<b>Smokers</b>	1 (5)	8 (22)	0.15*
<b>Diabetics</b>	0 (0)	4 (11)	0.29*
<b>CD duration</b> (years)	6 (0-40)	5 (0-35)	0.23+
<b>Baseline CDAI</b>	173 (9-547)	164 (14-485)	0.49+
<b>Baseline PCDAI</b>	12 (5-29)	10 (1-22)	0.55+
<b>Use of draining seton(s)</b>	15 (79)	35 (95)	0.17*
<b>Type of fistula(s)</b>			
Perianal	13 (69)	27 (72)	0.37^
Rectovaginal	1 (5)	5 (14)	
Both	5 (26)	5 (14)	
<b>Biologic</b>			
Infliximab	5 (26)	18 (49)	0.31^
Adalimumab	13 (69)	16 (43)	
Natalizumab	0	1 (3)	
Vedolizumab	1(5)	2 (5)	
<b>Non-compliance</b>	10 (53)	17 (46)	0.78*
<b>Insurance</b>			
Private	13 (68)	19 (51)	0.33^
Medicaid	4 (21)	13 (35)	
Medicare	2 (11)	2 (6)	
None (charity care)	0 (0)	3 (8)	

Categorical variables reported as n (%), Continuous variables reported as median (range).

CD=Crohn's disease. CDAI=Crohn's disease activity index. PCDAI=Perianal Crohn's disease activity index

\*Fisher's exact test, +Mann-Whitney U test, ^Chi-Square test

## INCREASED OPERATIVE COMPLEXITY IN OBESE PATIENTS UNDERGOING RESTORATIVE PROCTOCOLECTOMY WITH ILEAL POUCH-ANAL ANASTOMOSIS AND SHORT-TERM OUTCOMES.

P134

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**Purpose/Background:** IPAA is the preferred surgical treatment for patients with chronic ulcerative colitis (CUC). Unfortunately, in approximately 10% of cases, an IPAA is unable to be performed in the operating room, most often due to inadequate mesenteric length. Previous data has shown that an increased body mass index (BMI) limits the technical feasibility of IPAA construction. Despite the known increased technical difficulty, limited data exists on the differences on the perioperative outcomes in obese versus non-obese patients.

**Methods/Interventions:** We performed a retrospective review of all patients undergoing either two or three stage IPAA for CUC at our institution between January 2002 and July 2015. Data collected included preoperative patient demographics, operative characteristics, and 30-day postoperative complications. Patients were separated into an obese (BMI > 30) and non-obese (BMI ≤ 30) group and univariate analysis was performed.

**Results/Outcome(s):** Of 909 IPAA performed during the study period, 154 patients were obese (BMI > 30) and 755 were not obese (BMI ≤ 30). There was no significant difference in preoperative hemoglobin, white blood cell count, albumin, or the use of steroids or immunomodulators between the obese and non-obese groups. For a two stage IPAA, obese patients were less likely to undergo laparoscopic IPAA (47.1% in obese versus 73.4% in non-obese,  $p < 0.0001$ ), had greater estimated blood loss (271.2 mL versus 205.6 mL,  $p = 0.005$ ), and a longer operative time (288.7 minutes versus 270.1 minutes,  $p = 0.02$ ). For the three stage IPAA group, obese patients were also less likely to undergo a laparoscopic procedure (15.8% versus 29.4%,  $p = .03$ ), had greater estimated blood loss (301.1 mL versus 186.1 mL,  $p < 0.0001$ ), and longer operative times (237.7 minutes versus 200.5 minutes,  $p = 0.0002$ ). Postoperatively, obese patients had a longer length of stay in the hospital if undergoing a two stage procedure (8.8 days versus 7.6 days,  $p = 0.009$ ) and an increased rate of superficial surgical site infections for both two stage (13.7% versus 6.3%,  $p = 0.049$ ) and three stage procedures (26.9% versus 13.0%,  $p = 0.01$ ). The incidence of pelvic sepsis did not differ between the obese group and non-obese group (two stage: 7.8% versus 8.9%, three stage: 9.6% versus 6.0%, both  $p > 0.05$ ).

**Conclusions/Discussion:** Successful IPAA in patients with BMI > 30 takes longer to perform, more often requires an open procedure, and is associated with greater blood

loss. Postoperatively, these patients have an increased length of stay and increased rates of superficial surgical site infections. These findings underscore the need to counsel patients on preoperative weight loss before undergoing elective IPAA.

Variable	BMI > 30 (n = 154)	BMI ≤ 30 (n = 755)	P
Male (%)	89 (57.8)	451 (59.7)	0.71
Preoperative albumin (g/dL)			
2 stage, mean ± SEM	4.0 ± 0.07	3.9 ± 0.04	0.61
3 stage, mean ± SEM	4.2 ± 0.10	4.3 ± 0.04	0.35
Preoperative steroid use <sup>a</sup> (%)	64 (62.8)	271 (37.8)	0.36
Preoperative immunomodulator use <sup>a</sup> (%)	31 (30.4)	153 (32.6)	0.67
3 stage IPAA (%)	52 (33.7)	285 (37.7)	0.35
Laparoscopic IPAA			
2 stage (%)	48 (47.1)	345 (73.4)	<0.0001
3 stage (%)	8 (15.8)	84 (29.4)	0.03
Operative time (minutes)			
2 stage, mean ± SEM	288.7 ± 7.7	270.1 ± 3.4	0.02
3 stage, mean ± SEM	237.7 ± 11.9	200.5 ± 3.6	0.0002
Estimate blood loss (mL)			
2 stage, mean ± SEM	271.2 ± 22.5	205.6 ± 9.7	0.005
3 stage, mean ± SEM	301.1 ± 31.7	186.1 ± 9.0	<0.0001
Length of stay (days)			
2 stage, mean ± SEM	8.8 ± 0.6	7.6 ± 0.2	0.03
3 stage, mean ± SEM	6.2 ± 0.4	5.7 ± 0.2	0.26
Wound Infection			
2 stage (%)	14 (13.7)	36 (6.3)	0.049
3 stage (%)	14 (26.9)	37 (13%)	0.01
Pelvic Sepsis			
2 stage (%)	8 (7.8)	51 (8.9)	0.36
3 stage (%)	5 (9.6)	17 (6.0)	0.32

<sup>a</sup>Excludes 337 patients who underwent 3 stage IPAA

Demographics, Operative Characteristics, and Complication Rates

## THE SITE OF RECURRENCE AND THE MANAGEMENT PLAN FOR POSTOPERATIVE CROHN'S DISEASE IN THE BIOLOGIC ERA.

P135

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**Purpose/Background:** An anastomotic site has been considered the most likely point of recurrence in Crohn's disease (CD). However, the recent use of biologics and endoscopic balloon dilation has changed the postoperative course. The aim of this study was to evaluate the site of recurrence and the effectiveness of biological therapy in patients with postoperative CD.

**Methods/Interventions:** The medical records of 323 patients who had undergone surgery for intestinal CD between 2004 and 2015 were retrospectively reviewed. Ninety-one women and 232 men with a median age of 35 years at the time of surgery were included in the study. Surgical indications were stricture (145 patients), stricture and fistula (102 patients), fistula and abscess (44 patients), and other indications (32 patients). The anastomosis was most commonly accomplished in a hand-sewn end-to-end manner. Patients were divided into four groups according to use of biologics (BIO) after surgery. The BIO(-) patients did not receive any biologics. The BIO(+) group was subdivided into three subgroups: BIO1 patients received biologics prior to surgery, BIO2 patients received biologics immediately after surgery, and BIO3 patients received biologics after recurrence. Outcomes were retrospectively compared in these groups.

**Results/Outcome(s):** Eight patients had undergone endoscopic balloon dilation for a stricture at a previous

anastomosis, and 26 had undergone reoperation for recurrence of CD. Of the 22 patients who had a previous anastomosis, 11 (50%) had a reoperation site that was not related to the previous anastomosis. The 5-year reoperation rate was 18.2% for the BIO(-) group and 10.2% for the BIO(+) group. The 5-year reoperation rate for the BIO1 group was significantly higher than the rates for the BIO2 and BIO3 groups, which were 15.1%, 4.5%, and 4.3%, respectively.

**Conclusions/Discussion:** Recently, half of recurrence site have not been related to a previous anastomosis. Overall management is necessary for the prevention of reoperation, regardless of the anastomotic procedure. The reoperation rate of patients who were administered anti-tumor necrosis factor (TNF) therapy prior to surgery was higher than that of patients who were administered anti-TNF therapy immediately after surgery or at the time of recurrence. Optimization of anti-TNF therapy or other treatments should be considered in these patients.

#### SARCOPENIA IS ASSOCIATED WITH WORSE PREOPERATIVE RISK FACTORS IN UC PATIENTS UNDERGOING COLECTOMY.

P136

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**Purpose/Background:** Sarcopenia has been associated with worse outcomes in cancer patients, and only recently has it been evaluated in patients with inflammatory bowel disease. We aim to describe the prevalence of sarcopenia and its association with preoperative risk factors for UC patients undergoing colectomy.

**Methods/Interventions:** Skeletal muscle mass index was measured for UC patients undergoing colectomy who had a CT scan performed within 30 days of surgery at a tertiary care center, 2007-2013. Using Mimics® software (Belgium), skeletal muscle area was measured at the L3 level and then used to calculate the skeletal muscle mass index ( $\text{cm}^2/\text{m}^2$ ). Sarcopenia was defined as two standard deviations below the index level defined in healthy adults. Cutoffs were previously established in adult obese cancer patients: 38.5 in females, 52.4 in males.

**Results/Outcome(s):** 36 patients were included in the study; mean age was 49.2 (17-84), 77.8% were male. Mean BMI was 26.8 (16.3-46.2). Only four (11.8%) had surgery reported as urgent or emergent. The majority of patients had total or subtotal colectomy performed (58.3%); 16.7% total proctocolectomy (TPC), 11.1% completion proctectomy and 13.9% had partial colectomy. 61.1% of patients were classified as sarcopenic; 37.5% of females and 67.9% of males. Age, gender, race and co-morbidities were not associated with sarcopenia. Patients with sarcopenia were more likely to be on immunomodulators and 5-ASA agents

( $p=0.49$  and  $0.008$ , respectively) as well as receiving parenteral nutrition preoperatively ( $p=0.048$ ). Sarcopenic patients were also more likely to undergo subtotal/total colectomy or TPC ( $p=0.028$ ,  $0.014$ ) compared to partial colectomy or completion proctectomy. The associations between sarcopenia and previous abdominal surgeries and current smoking trended toward significance and although also not statistically significant, mean preoperative hemoglobin (10.8 vs. 12.24 gm/dL) and prealbumin (2.53 vs. 3.37 mg/dL) were both lower in sarcopenic patients.

**Conclusions/Discussion:** In our study, over 60% of UC patients undergoing colectomy were found to be sarcopenic. They were more likely to be on TPN, immunomodulators and ASA agents and could possibly have been more anemic and malnourished preoperatively. Although urgent surgery was not more common in sarcopenic patients, they were more likely to undergo subtotal colectomy or TPC which may serve as a marker for more severe disease. Thus, sarcopenia could be an important amenable factor in terms of preoperative risk assessment and outcomes for UC patients requiring surgery.

#### PROGNOSIS OF CD PATIENTS WITH FECAL DIVERSION.

P137

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**Purpose/Background:** Fecal diversion is employed in the treatment for Crohn's disease (CD). As the number of long standing CD patients is increasing in Japan, the number of the CD patients in need of diversion surgery is also increasing. The purpose of this study is to evaluate the prognosis of fecal diversion for CD.

**Methods/Interventions:** Methods: One hundred and thirty two patients (96 males and 36 females) with fecal diversion for CD were included and all had longer than 5 years observational periods. Average age at onset of Crohn's disease was 21 years and average age at diversion was 33 years. Average duration of follow-up after diversion was 132 months. Medical records were reviewed and clinical data was collected, which were indication for diversion, restoration of continuity, requirement of abdominoperineal resection (APR), stoma related complications (SRC), reoperation for SRC and other intestinal disease, and complicated anorectal cancer.

**Results/Outcome(s):** Results: Indication for diversion were severe anorectal disease (ARD) ( $n=83$ ), protection for anastomosis ( $n=17$ ), treatment for anastomotic leakage ( $n=36$ ), diversion of severe disease ( $n=11$ ), and peritonitis ( $n=7$ ). Restoration rate of continuity of each indication as follows; 4.8%, 41.2%, 28.6%, 27.3% and 14.3%, respectively. Thirty one percent of all patients (41/132) and 41% of the patients with severe ARD (37/83) required APR. Forty two percent (55/132) had stoma related

complications such as, active disease just below stoma (n=28), peristomal fistula (n=26), retraction (n=14), stenosis (n=11), prolapse (n=7). Cumulative reoperation rate for SRC was 18.1% in 5 years and 30.8% in ten years after surgery and reoperation rate for other diseased intestine was 7.3% and 30.5%, respectively. Complicated anorectal cancer in diverted rectum occurred in 9 patients (6.8%).

**Conclusions/Discussion:** Conclusion: Restoration rate was relatively low among the CD patients with fecal diversion especially among patients with severe anorectal disease. Reoperation rate for stoma related complications was almost the same as the reoperation rate for other diseased intestine. Care must be taken for the CD recurrence of stoma site and anorectal cancer arises from diverted rectum in the treatment for CD patients with fecal diversion.

### RESTORATIVE PROCTOCOLECTOMY WITH ILEAL POUCH-ANAL ANASTOMOSIS IN ELDERLY PATIENTS – WHEN IS IT TOO OLD?

P138

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**Purpose/Background:** Ulcerative Colitis (UC) has a bimodal age distribution, with a second peak between 50 to 80 years of age. Restorative proctocolectomy with ileal pouch-anal anastomosis (IPAA) is the preferred surgical approach for ulcerative colitis (UC), however, little is known regarding the long-term results in respect of *de-novo* pouch performed in elderly patients with presumed weaker sphincter mechanisms. We aimed to determine pouch function and retention rate for index IPAA in this group of patients.

**Methods/Interventions:** A prospective collected database was queried to identify patients older than 50 years of age who were subjected to IPAA from 1980 until 2016. Only patients with UC were included to eliminate confounders. Redo-pouches were excluded. Patient were grouped according to age: 50-59 years, 60-69 years and 70 years or more. Short and long-term outcomes, and quality of life questionnaires were compared among the groups.

**Results/Outcome(s):** 601 patients subjected to IPAA over 50 years old were identified (399 patients between 50-59 y/o, 181 between 60-69 y/o, and 21 patients over 70 y/o). There were more males in patients older than 70 years of age, and more 2-stage procedures were performed in this group of patients. No difference was observed in pouch configuration, anastomosis type, surgical approach, or diverting ileostomy rate among the groups (table). Dysplasia rates were similar among groups (p=0.553). Superficial wound infection increased with age (p=0.023). There was a trend of more fistula and pouchitis in patients

over 70 y/o (p=0.052 and p=0.055, respectively). Pouch failure rate (defined by pouch resection or permanent diversion) increased with age, and it was statistically significant in patients older than 70 y/o (p=0.023). The reasons for pouch failure in this group of patients were anal canal cancer, fecal incontinence with skin excoriation, and pouch cutaneous fistula. The pouch failure in patients over 70 y/o occurred at later stage of follow-up (median 5.5 years), compared to 50-59, and 60-69 y/o groups (1.5 and 0.7 years respectively). For all patients over 50 y/o, multivariate stepwise logistic regression showed that pelvic sepsis [HR 4.8 (95%CI 1.5 – 15.4), p=0.009], fistula [HR 6.0 (95%CI 1.7 – 21.5), p=0.006], and mucosectomy with handsewn anastomosis [HR 4.5 (95%CI 1.4 – 14.7), p=0.012] were independently associated with pouch failure. No difference was observed in quality of life among the groups, but pouch function was worse for patients older than 60 y/o (table).

**Conclusions/Discussion:** In selected elderly patients with ulcerative colitis, IPAA may be offered with acceptable functional outcomes, although ileal pouch retention rates are decreased in patients older than 70 years of age.

### ANAL STENOSIS IN CROHN'S PATIENTS IN THE ERA OF BIOLOGICS.

P139

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**Purpose/Background:** The natural history of anal stenosis in Crohn's disease is largely unknown. There is an abundance of literature regarding fistulizing perianal Crohn's but very limited information on nonfistulizing disease. In the era of biologic medications, surgical treatment for Crohn's disease has decreased. Our hypothesis is that non surgical management for nonfistulizing perianal disease may be an effective alternative to surgery. The aim of this study was to evaluate the natural history of nonfistulizing perianal Crohn's disease.

**Methods/Interventions:** This study is a retrospective chart review of Crohn's patients with anorectal stricture from one private practice clinic from 2007-2016. We evaluated the age at diagnosis, use of biologic medication, number of dilation procedures, longest time between dilatations and long term outcomes.

**Results/Outcome(s):** Eleven patients with anal stenosis from Crohn's disease were identified. All patients underwent at least one stricture dilation. The average age of Crohn's diagnosis was 26 years old (range 13-60 years). Only one patient had never been treated with a biologic medication. Eight of eleven patients have continued to be managed conservatively with medication and stricture dilations for symptom control. Three of these patients have only required one stricture dilation. The time between dilation in patients requiring more than one procedure

varied from 1-5 years. The remaining three patients went on to require an abdominoperineal resection for anal stenosis.

**Conclusions/Discussion:** Medical therapy and serial dilations may be an effective alternative to surgical therapy in patients with anal stenosis due to Crohn's disease. Further investigation into patient selection may decrease the need for surgical treatment of anal stenosis.

### LONG-TERM SURGICAL OUTCOME OF ILEAL POUCH-ANAL ANASTOMOSIS WHEN USED INTENTIONALLY FOR WELL-DEFINED CROHN'S DISEASE.

P140

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**Purpose/Background:** Crohn's disease (CD) is considered a contraindication to ileal pouch-anal anastomosis (IPAA). A preliminary study from our group in 17 patients showed the intentional use of IPAA in CD compared to ulcerative colitis patients was associated with a higher incidence of postoperative recurrent inflammation but no significant difference in pouch failure (Le Q, *et al.*, *Inflamm Bowel Dis* 2013;19:30-6). We hypothesized that pouch failure would remain low in a larger cohort of patients

#### P138 Demographics, intraoperative details, complications and quality of life by age group

Group	50-59 (n=399)	60-69 (n=181)	70+ (n=21)	p value
Age at surgery (mean/SD)	54.2 ± 2.9	63.4 ± 2.8	73.0 ± 2.3	<0.001
Male Gender	259 (65%)	121 (67%)	19 (91%)	0.043
Total proctocolectomy	233 (58%)	99 (55%)	18 (86%)	0.024
Completion proctectomy	166 (42%)	82 (45%)	3 (14%)	0.024
J-Pouch configuration	384 (96%)	173 (96%)	21 (100%)	0.602
S-Pouch Configuration	15 (4%)	8 (4%)	-	0.602
Stappled Anastomosis	368 (92%)	165 (91%)	19 (91%)	0.776
Handsewn Anastomosis	31 (8%)	16 (9%)	2 (10%)	0.776
Laparoscopic approach	56 (14%)	24 (13%)	2 (10%)	0.924
Intraoperative diversion	380 (95%)	171 (95%)	20 (95%)	0.879
Dysplasia	65 (16%)	34 (19%)	5 (24%)	0.553
Anastomotic Separation	25 (6%)	12 (7%)	2 (10%)	0.736
Anastomotic Stricture	46 (12%)	23 (13%)	2 (10%)	0.913
Fistula	13 (3%)	8 (4%)	3 (14%)	0.052
Hemorrhage	12 (3%)	7 (4%)	1 (5%)	0.538
Obstruction	56 (14%)	25 (14%)	1 (5%)	0.603
Pelvic Sepsis / Chronic Abscess	28 (7%)	12 (7%)	3 (14%)	0.347
Pouchitis	111 (28%)	36 (20%)	8 (38%)	0.055
Wound Infection	34 (9%)	27 (15%)	4 (19%)	0.023
Other	210 (53%)	87 (48%)	15 (71%)	0.113
Pouch failure	10 (3%)	8 (4%)	3 (14%)	0.023
Overall CGQOL score (mean, SD) (n=527)	0.73 ± 0.18	0.75 ± 0.16	0.71 ± 0.17	0.306
Quality of health (mean, SD) (n=527)	7.6 ± 1.8	7.6 ± 1.8	7.1 ± 1.9	0.453
Energy level (mean, SD) (n=527)	6.7 ± 2.0	7.1 ± 2.0	6.6 ± 1.8	0.097
Quality of life (mean, SD) (n=527)	7.6 ± 1.9	7.9 ± 1.6	7.6 ± 1.8	0.480
Seepage during the day (n=321)	58 (27%)	44 (49%)	6 (43%)	<0.001
Seepage during the night (n=321)	86 (40%)	51 (57%)	7 (50%)	0.028
Would recommend surgery to others (n=313)	203 (95%)	79 (91%)	11 (85%)	0.113
Follow up, years (mean/SD)	9.6 ± 7.3	7.5 ± 6.1	7.0 ± 4.6	0.001

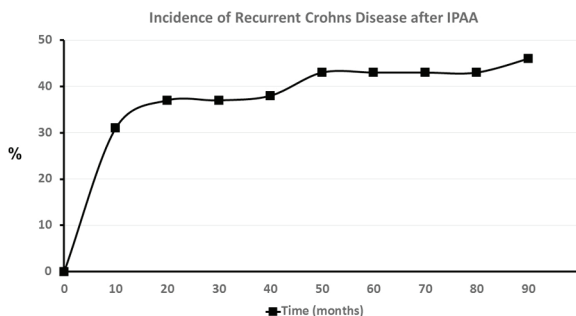
Data in number / percentage, otherwise specified

undergoing IPAA intentionally for CD with longer post-operative follow-up.

**Methods/Interventions:** A prospective inflammatory bowel disease registry was queried for patients with preoperative CD undergoing IPAA. Patients were considered to have CD before surgery based on a history of small bowel disease, perianal disease, non-crypt associated granuloma, or pretreatment skip colonic lesions. Patients were prospectively assessed for pouchitis or CD. Pouchitis (acute and chronic), postoperative CD (pouch inflammation into the afferent limb or pouch fistula) or pouch failure (need for permanent diversion) were assessed.

**Results/Outcome(s):** Thirty-five patients with preoperative CD were identified. CD was diagnosed based on perianal disease (n=11;34%), small bowel disease (n=9;26%), discontinuous inflammation (n=9;26%) and noncaseating non-crypt associated granuloma (n=6;17%). Indications for surgery were medically unresponsive disease (32;91%) or cancer/dysplasia (n=3;9%). After a median follow-up time of 47 (range, 2-196) months, pouchitis developed in 9 (26%) patients (acute pouchitis (n=7), chronic pouchitis (n=2)). Sixteen (49%) patients developed postoperative recurrent CD (afferent limb (n=8), pouch fistulizing disease (n=4), perianal disease (n=4)). Only 1 patient (3%) failed postoperative medical therapy and required fecal diversion. The incidence of recurrent CD over time is shown in Figure 1.

**Conclusions/Discussion:** This largest ever reported series on the intentional use of IPAA in well-defined CD showed a high incidence of postoperative recurrent disease (49%). However, there was a low (3%) incidence of ultimate pouch failure. Highly motivated patients with colorectal CD involving the more proximal and/or distal gastrointestinal tract may wish to undergo IPAA and avoid a definitive end ileostomy.



## PROLONGED PREOPERATIVE HOSPITALIZATION INCREASES THE RATE OF SERIOUS MORBIDITY IN IBD PATIENTS.

P141

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**Purpose/Background:** Increases in the use of biologic medication have led to decreases in the surgical management of inflammatory bowel disease (IBD). However, there is evidence to suggest surgery may have improved survival over prolonged medical therapy. In order to understand outcomes of hospitalized IBD patients who may benefit from earlier surgical involvement, we aimed to 1) to determine the point at which the risk of death/serious morbidity (DSM) increases significantly in hospitalized IBD patients and 2) to determine the factors associated with DSM in this patient population.

**Methods/Interventions:** The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP 2011-2014) was used to identify all patients with IBD who were hospitalized >1 day prior to a small bowel or colorectal procedure. The primary outcome was DSM within 30 days after a procedure. The rate of minor morbidities (MM) was also calculated. A JoinPoint regression analysis was performed to determine the point at which the rate of DSM or MM changed significantly during the pre-procedure hospital course. Descriptive statistics were performed to compare patients admitted before and after the JoinPoint. Multivariable logistic regression was used to identify factors associated with DSM.

**Results/Outcome(s):** There were 2,912(19.8%) patients admitted prior to surgery with a median pre-operative length of stay of 6days (IQR 3,9). On JoinPoint regression analysis, the rate of DSM increased significantly from 6-9days(slope=14.44;p<0.001). While the rate of DSM in Crohn's patients increased steadily without an inflection point, the DSM rate in ulcerative colitis patients mirrored the overall cohort, significantly increasing at day 6(slope=17.68;p=0.008). The rate of MM increased steadily with increasing length of pre-operative stay and did not differ by IBD type (slope=2.56). When comparing the cohort of patients hospitalized for <6 days(Pre6) to ≥6 days(Post6) on univariate analysis, type of IBD, ASA classification, steroid use, weight loss, history of cardiac disease, history of bleeding disorder, albumin <3g/dL, white cell count ≥12,000, hematocrit <30% and procedure type (open and bowel location) were significantly different. After adjustment, hospitalization ≥6days was associated with a 29% increased odds of DSM on multivariable analysis (see Table). Both the overall cohort and the Post6 subset, age >55 years, serum albumin <3g/dL, hematocrit ≤30%, INR ≥1.5, and an open procedure also remained significant.

**Conclusions/Discussion:** The rate of DSM increases significantly in IBD patients who have been hospitalized



for  $\geq 6$  days pre-operatively. Even after adjustment, hospitalization  $\geq 6$  days remains significantly associated with DSM. This data suggests that there are unmeasured factors which contribute to these outcomes, and that hospitalized IBD patients who undergo surgery may benefit from earlier surgical intervention in lieu of medical optimization.

Table. Factors associated with death and serious morbidity (DSM).

	All Hospitalized IBD Patients	Hospitalized $\geq 6$ Days Before Surgery
	OR (95% CI)	OR (95% CI)
<b>Admission Status</b>		
<6 days Before Surgery "Pre6"	Ref	---
$\geq 6$ Days Before Surgery "Post6"	1.29 (1.06-1.57)	---
<b>Type of IBD</b>		
Crohn's Disease	Ref	Ref
Ulcerative Colitis	1.05 (0.85-1.29)	1.10 (0.84-1.44)
<b>Age</b>		
18-35 years	Ref	Ref
36-55 years	1.19 (0.95-1.50)	1.17 (0.87-1.58)
56-75 years	1.67 (1.28-2.17)	1.93 (1.37-2.72)
>75 years	2.36 (1.46-3.84)	1.46 (0.75-2.85)
<b>Comorbidities</b>		
Steroid Use	1.14 (0.93-1.39)	1.27 (0.97-1.66)
*Bleeding Disorder	1.51 (1.06-2.16)	NS
*Transfusion	1.63 (1.21-2.20)	1.62 (1.10-2.40)
<b>Pre-Operative Labs</b>		
Albumin <3 g/dL	1.53 (1.24-1.90)	1.58 (1.19-2.10)
Hematocrit $\leq 30\%$	2.05 (1.67-2.52)	1.95 (1.50-2.53)
INR $\geq 1.5$	2.37 (1.58-3.55)	2.70 (1.53-4.77)
<b>Procedure Type</b>		
Laparoscopic	Ref	Ref
Open	1.84 (1.50-2.26)	1.85 (1.42-2.42)
Small Bowel	Ref	Ref
Colorectal	1.50 (1.10-2.04)	NS
<b>Model Statistics</b>		
Area Under the Curve	0.7100	0.7044
Hosmer-Lemeshow	0.5016	0.4237
Goodness of Fit		

→Variables that were tested but not significant and therefore not included in the final model: race, sex, year of operation, ASA classification, smoking, weight loss, acute renal failure, end stage renal disease, ascites, hypertension, history of cardiac disease, diabetes, creatinine  $\geq 2\text{mg/dL}$ , bilirubin  $\geq 2\text{mg/dL}$ , white blood cell count, platelet count, and case priority (emergent/elective).

\*Bleeding disorder refers to any active, chronic condition that places the patient at risk for excessive bleeding.

\*Transfusion refers to any pre-operative loss of blood that requires transfusion of at least 1u packed red cells in the 72 hours prior to surgery.

Ref=Reference; NS=Not Significant

## POSTOPERATIVE PORTOMESENTERIC VEIN THROMBOSIS: IS ANTICOAGULATION NECESSARY?

P142

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**Purpose/Background:** Portomesenteric vein thrombosis (PMVT) is a rare post-operative complication that can lead to potentially devastating consequences such as bowel ischemia or necrosis, cavernous transformation, and portal hypertension. Therapeutic anticoagulation is often given to reduce the potential morbidity and mortality; however, it carries inherent risks of bleeding especially in the immediate post-operative period. Moreover, many PMVT are incidentally found and clinically asymptomatic, clouding the appropriate management of PMVT.

**Methods/Interventions:** We performed a retrospective cohort study of all patients undergoing major small bowel or colon resection since and diagnosed with a post-operative PMVT within 30 days of their operation at one tertiary institution. PMVT was diagnosed based on CT scan or ultrasound findings of thrombus within the superior mesenteric vein, or intrahepatic or extrahepatic portal veins. Patients with a history of portal vein manipulation

(such as transjugular intrahepatic portosystemic shunt or portal vein embolization), liver transplant, primary hypercoagulable state, or previous venous thromboembolism requiring anticoagulation were excluded.

**Results/Outcome(s):** Fifty patients were included in the study. Twenty-four (48%) were female. Thirty-one (62%) were white. The median age at the time of surgery was 54 (range 20-86) years old. Cancer was the pathologic diagnosis for 12 (24%) patients while inflammatory bowel disease was the diagnosis for 18 (36%) patients. The most common reasons prompting the imaging study that diagnosed the PMVT was abdominal pain (32%), fever (32%), and leukocytosis (30%) on median post-operative day 7 (range 2-27). Thirty-three (66%) patients were found to have isolated PMVT on imaging. The right portal vein was the most common site of thrombosis (74%). Twenty-one (42%) patients were treated with anticoagulation; however, duration varied greatly from 7-180 (median 75) days. Patients with superior mesenteric vein thrombosis were more likely to have multiple areas of thrombosis (OR=5.7,  $p<0.01$ ) and to be placed on anticoagulation therapy (OR = 4.0,  $p=0.03$ ). Of the cohort, only one patient had worsening clot burden at follow-up imaging while 24 (48%) patients showed improvement. Thrombus progression was not associated with anticoagulation therapy ( $p=0.33$ ). There were 14 deaths; none were directly attributed to PMVT. Risk of death increased with being female (OR=3.9,  $p=0.05$ ), having SMV thrombosis (OR=10.4,  $p<0.01$ ), and having a pathologic diagnosis of cancer (OR= 6.3,  $p<0.01$ ). Undergoing a rectal resection decreased the risk of death (OR=0.22,  $p=0.04$ ). Anticoagulation treatment had no effect on risk of death ( $p=0.52$ ).

**Conclusions/Discussion:** This data suggest that anticoagulation may not be necessary for the treatment of PMVT as it had no effect on clot burden or mortality. However, larger, prospective studies are needed.

## COMPARABLE QUALITY OF LIFE IN ULCERATIVE COLITIS PATIENTS FOLLOWING 2-STAGE VERSUS 3-STAGE PROCTOCOLECTOMY WITH ILEAL POUCH-ANAL ANASTOMOSIS.

P143

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**Purpose/Background:** Most surgeons assume that the use of a 3-stage procedure for active colitis is a safer approach with less complications compared to a 2-stage procedure, although recent data suggest that outcomes are comparable. We sought to compare late functional outcomes of patients undergoing 2- versus 3-stage ileal

pouch-anal anastomosis (IPAA) for active ulcerative colitis.

**Methods/Interventions:** A retrospective review was conducted of all patients who underwent 2- or 3-stage IPAA for active ulcerative colitis due to failure of medical management from 2000 to 2015 in a high-volume institution. All patients were sent a quality of life survey six months following ileostomy reversal. Major outcomes included bowel movements per day, soilage, and pouchitis, and power calculations confirmed adequate sample size to detect clinically relevant differences. Outcomes were compared with the Fisher Exact test, and logistic regression was used to adjust for potential confounders.

**Results/Outcome(s):** We identified 253 patients who underwent 2- or 3-stage IPAA over the study period, of whom 41 (16%) underwent intervention for dysplasia/malignancy and were excluded. Of the remaining 212, 113 (53%) completed the survey instrument; there were no differences in presentation of responders compared to non-responders. Of responders, 81 patients (78%) underwent 2-stage procedures, and 32 had a 3-stage approach (28%). There were no differences in sex, age, body mass index, smoking status, or comorbidities. Patients undergoing 2-stage procedures were more likely to be on immunomodulators (43% vs. 19%,  $P = .03$ ), but had no significant difference in use of steroids (70% vs. 84%,  $P = .16$ ) or biologic agents (33% vs. 32%,  $P = 1.0$ ). While patients undergoing the 3-stage procedure were more likely to have been done urgently (75% vs. 26%,  $P < .001$ ), there was no difference in the pathologic severity of disease in the colon or in the rectal cuff. There was no difference in perceived quality of life compared to before IPAA (2-stage: 83% better, 3-stage: 84% better,  $P = 1.0$ ) or compared to expectations (2-stage: 51% better, 3-stage: 56% better,  $P = .68$ ). There were also no differences in number of bowel movements per day, pouchitis, or sexual satisfaction (Table). Patients undergoing 3-stage procedure were more likely to have nocturnal soilage (38% vs. 17%,  $P = .03$ ), although there was no difference after adjusting for original

procedure urgency (Odds Ratio 2.0, 95% Confidence Interval 0.7 – 5.6).

**Conclusions/Discussion:** Patients undergoing 2-stage compared to 3-stage IPAA for failed medical management of active ulcerative colitis have comparable quality of life following ileostomy reversal. Two-stage IPAA should be considered over the traditional 3-stage procedure in appropriate situations.

### SHORT -TERM OUTCOMES OF ROBOTIC PROCTECTOMY WITH ILEAL POUCH -ANAL ANASTOMOSIS.

P144

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**Purpose/Background:** Total proctocolectomy remains the procedure of choice for many patients with ulcerative colitis (UC) and familial adenomatous polyposis syndrome (FAP). Open and laparoscopic proctocolectomy with ileal pouch anal anastomosis (IPAA) are well established, however the first case series demonstrating the feasibility of robotic proctectomy and IPAA was published in 2011. Since then our institution has gained significant experience in this procedure. Our goal was to examine our series with respect to safety and feasibility, and to examine short term outcomes and potential advantages of the robotic platform.

**Methods/Interventions:** A university hospital, single institution prospectively gathered database was reviewed and included all patients who underwent a robotic proctectomy between January 2015 and November 2016. The inclusion criteria were any patient over 18 years old with UC or FAP who underwent a robotic proctectomy with IPAA for their 2<sup>nd</sup> stage operation. Prior total abdominal colectomy in these patients were performed either open, laparoscopic or robotic. Exclusion criteria were any patient who had a laparoscopic or open proctectomy with IPAA.

### P143 Quality of Life Survey Responses by IPAA Surgical Approach

N (%), Median (IQR)	Two-Stage (N=81)	Three-Stage (N=32)	P-Value
QOL Better than Pre-IPAA	67 (83%)	27 (84%)	1.0
QOL Better than Expected	41 (51%)	18 (56%)	.68
Scar Better than Expected	32 (40%)	13 (41%)	1.0
Daytime Soilage, ever	12 (15%)	7 (22%)	.41
Nocturnal Soilage, ever	14 (17%)	12 (38%)	.03
Bowel Movements per Day	7 (6-9)	7 (6-8.5)	.49
Pouchitis Treatment, in last 6 months	12 (15%)	7 (22%)	.12
Depression, at least sometimes	9 (11%)	4 (13)	1.0
Sexual Satisfaction, at least moderately	45 (56%)	13 (41%)	.11
Male Patients: Erectile Dysfunction, ever	9 (23%)	3 (23%)	1.0

IQR = Interquartile Range; IPAA = Ileal Pouch-Anal Anastomosis; QOL = Quality of Life

**Results/Outcome(s):** Fifteen (n=15) patients underwent robotic proctectomy with IPAA for UC or FAP (UC=13, FAP=2) (Table 1). The average age was 38.6 (range 19-55) years old. The average BMI was 22.6kg/m<sup>2</sup> (range 16.3-26.9). All patients had a diverting loop ileostomy placed at the time of IPAA. The mean time to return of bowel function was 1.6 days (range 1-2 days). The average EBL was 132cc (range 50cc-300cc). There were no conversions to open procedures. The mean LOS was 3.6 days (range 2-6). There was one morbidity; a patient with adrenal crisis requiring steroids. Four of the fifteen patients returned to the hospital within 30 days of discharge for complaints of abdominal pain; 1 required percutaneous drainage of an abscess. There were no anastomotic leaks. To date, 14 of 15 patients have undergone ileostomy closure after exhibiting no leak on gastrograffin enema, without IPAA leak or pelvic abscess.

**Conclusions/Discussion:** Robotic proctectomy is established as it offers advantages over laparoscopy in the bony confines of the pelvis. Robotic proctectomies for rectal cancer have been proven in the literature to be safe and feasible; however other indications have not been studied. We report the largest series to date of 15 patients who underwent robotic proctectomy with IPAA. Our series shows that the surgery is safe and feasible with no intraoperative complications and minimal EBL. Robotic advantages include rapid return of bowel function and short LOS. In addition we show excellent short-term results, including no mortalities, no major postoperative complications, and no anastomotic leak. Long-term outcome data such as pouch function and quality of life is currently being collected and will be examined in the future.

## IMPACT OF OBESITY ON PATIENTS WITH CROHN'S DISEASE FOLLOWING MAJOR SURGERY.

P145

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**Purpose/Background:** Obesity is associated with worse outcomes in almost all surgical studies. Crohn's disease, however, has traditionally been seen as a wasting disease, as these patients tend to suffer from malabsorption and malnutrition. A large 3-year, nation-wide study reported a steady rise in obese Crohn's patients (16%). They also found higher perioperative morbidity in obese patients (32%) than non-obese patients (22%). Since our health-care system is located in the southeastern region of the US, we sought to determine whether our Crohn's patients were associated with a higher rate of obesity than the national study; we also sought to evaluate whether obese Crohn's patients were experiencing an increased rate of morbidity.

**Methods/Interventions:** All patients diagnosed with Crohn's disease who underwent a major abdominal procedure between March 2009 and August 2015 were identified and included in this study (N=170). Data were then divided into 2 cohorts based on patient BMI: non-obese (n=130) and obese (n=40). Obesity was defined as a BMI  $\geq$  30. Data collection included patient demographics and comorbidities, steroid use, surgical procedures, procedure type (open vs. laparoscopic), preoperative laboratory values, and short-term perioperative complications (<30 days).

**Results/Outcome(s):** From the entire study population, 23.5% of patients were obese. Since 2009, the rate of obesity has increased, with the highest rates reported in

### P144 Robotic Pouch Patient Statistics

Sex	Age	BMI	Stage 1 TAC	Indication	Robotic Pouch EBL (cc)	Return of bowel function (days)	Robotic Pouch LOS (days)
Female	53	25.6	robotic	UC	100	1	4
Female	46	26.89	robotic	UC	100	2	3
Male	39	21.63	robotic	UC	300	2	3
Female	40	18.03	robotic	FAP	150	2	3
Female	19	20.1	laparoscopic	UC	75	1	6
Female	34	18.4	robotic	UC	125	1	2
Female	29	16.3	laparoscopic	UC	50	2	2
Male	46	26.34	laparoscopic	UC	75	2	4
Female	55	24	robotic	FAP	250	1	4
Male	34	18.3	laparoscopic	UC	100	2	6
Male	23	23.6	laparoscopic	UC	75	2	2
Male	53	22.83	laparoscopic	UC	200	2	4
Male	45	25.12	robotic	UC	300	2	2
Male	25	25.23	laparoscopic	UC	30	1	3
Male	39	27.26	laparoscopic	UC	50	1	2

2011 to 2014 (40%, 34.6%, 25.8%). The obese cohort was significantly older than the non-obese ( $44.6 \pm 13.2$  vs.  $34.9 \pm 15.9$ ;  $P < 0.001$ ) and had slightly more females (67.5% vs. 59.2%;  $P = 0.35$ ). Comorbidities were similar between groups, aside from the obese group having a higher rate of diabetes (12.5% vs. 3.1%;  $P = 0.02$ ). No significant differences were seen between cohorts in steroid use, procedure type, and perioperative lab values. Perioperative morbidity, however, was significantly higher in the obese cohort (47.5% vs. 21.5%;  $P < 0.001$ ). Specifically, obese patients had a higher rate of superficial surgical site infections ( $P < 0.001$ ), wound dehiscence ( $P < 0.01$ ), and deep vein thrombosis ( $P < 0.01$ ) than the non-obese cohort.

**Conclusions/Discussion:** These data reaffirm the nation-wide findings which showed an increasing proportion of obese Crohn's patients, as well as an association between a high BMI and perioperative morbidity. Our 5-year results, which solely included Crohn's patients living in the southeastern US, revealed an even higher average rate of obesity (23.5%); it also showed that approximately half of the obese patients experienced at least one complication (47.5%). Based on these data, colorectal surgeons may need to consider whether there should be a change in the treatment of obese Crohn's patients, including establishment of a wound closure protocol and managing obese Crohn's patients as higher risk.

### EMERGENCY COLECTOMY FOR INFLAMMATORY BOWEL DISEASE: 10-YEAR EXPERIENCE.

P146

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**Purpose/Background:** Acute severe inflammatory bowel disease (IBD) is a life-threatening condition with a mortality of 2.9%. Guidelines recommend colectomy for those failing medical therapy. The fate of the rectum following acute colectomy is unknown. We present our experience with a 10 year cohort.

**Methods/Interventions:** A retrospective review of patients undergoing emergency colectomy for IBD between 2003- 2013 was performed. Data were collected from theatre records and patient notes and analysed against the European Crohns and Colitis Organisation guidelines (2012).

**Results/Outcome(s):** One hundred and fifty eight colectomies were performed of which 81 (M:F 43:38, median age 46 (16-88)) were for acute IBD between 2003-2013. Sixty-nine patients had ulcerative colitis (UC), 11 had Crohns disease (CD). Sixty-seven percent of patients were seen by a gastroenterologist on the day of admission. Colorectal surgical review occurred on average 8 days after admission (range 0-135 days). Seventy-seven percent of

patients were seen pre-operatively by a stoma specialist nurse. The average duration of conservative management was 11.2 days (0-135). Stools were sent for analysis in 50.6% of patients and was positive for *Clostridium difficile* in 3 patients (7%). Fifty-one patients had a plain abdominal radiograph pre-operatively of which 13 demonstrated megacolon. Only 15 patients had a CT scan pre-operatively. Sixty-three patients underwent surgery for failure of medical management. Other indications for surgery were obstruction (2), abscess (2), perforation (3) and toxic megacolon (11). Sixty-three patients underwent subtotal colectomy (9 laparoscopic, 1 laparoscopic converted to open) with the remainder having proctocolectomy (18). A total of 34 patients went on to have an ileal pouch-anal anastomosis (IPAA) procedure. Five patients had IPAA at the initial surgery. For the rest (29), the average wait between colectomy and elective IPAA was 444.5 days (0-1330). Of the 63 patients who underwent a subtotal colectomy, 39 patients underwent completion proctectomy, either as a definitive procedure (9) or at the time of IPAA (30). One patient underwent an ileorectal anastomosis 16 retained their rectum with surveillance. The average time between initial surgery and completion proctectomy was 669 days (339 – 1549). Surgical complications included; wound infection (20), rectal stump leak (3), bleeding (4), venous-thromboembolism (2), ileus (9) and cardiorespiratory events (7). There were 3 (3.7%) mortalities within 30 days of admission (2 intra-abdominal sepsis and 1 necrotising fasciitis). Overall mean length of admission was 28.4 days. Post op mean length of admission was 17.7 days.

**Conclusions/Discussion:** Compliance with IBD standards appears low and requires changes to practice. Analysing the fate of the rectum has revealed that many patients wait over a year for definitive rectal surgery. Almost a quarter of our patients retain their rectum and remain at risk of developing neoplasia.

#### P146 Pre-operative parameters

Steroids (IV)	52 patients (53%)
Steroids (PO)	9 patients (11%)
2nd line medical therapy	17 patients (28%)
Mean number stools / 24hr	9 (1-30)
Mean CRP (mg/L)	77 (5-497)
Mean Hb (g/L)	11.6 (7-19)
Mean Albumin (g/L)	32.2 (18-48)

## MECHANICAL BOWEL PREPARATION BEFORE COLORECTAL RESECTIONS FOR CROHN'S DISEASE.

P147

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**Purpose/Background:** Studies addressing the role of mechanical bowel preparation (MBP) before surgery in Crohn's disease patients are lacking.

**Methods/Interventions:** All consecutive elective colorectal resections for Crohn's disease with formation of primary anastomosis have been included in present retrospective analysis. Patients undergoing small bowel resections not including colon were excluded. Also, urgent surgeries and reversals of enterostomies were excluded. MBP was performed routinely between 1992 and 2004; it was omitted between 2005 and 2015 and introduced again 2016. Anastomotic complications were: anastomotic leakage, perianastomotic abscess, anastomotic fistula and perianastomotic peritonitis.

**Results/Outcome(s):** Overall, 660 bowel resections have been performed between 1992 and 2016. Of those, 444 cases of elective colorectal resections with construction of primary anastomosis were included in current analysis. The anastomotic complication rate was 9.6% in patients undergoing surgery after MPB as opposed to 32% when MBP was omitted ( $P < 0.001$ ). The positive impact of MBP was strongest in patients undergoing ileocolic resections for penetrating disease (8% vs. 45%,  $P < 0.001$ ). By the multivariate analysis, preoperative MBP reduced the risk of anastomotic complications significantly (Hazard Ratio 0.15; 95% CI: 0.05 – 0.44.  $P = 0.001$ ). Preoperative weight loss increased the anastomotic complication risk (HR 3.46; 95% CI 1.2 – 9.9.  $P = 0.021$ ).

**Conclusions/Discussion:** Preoperative MPB should be strongly considered before colorectal surgery in patients with Crohn's disease, especially in patients undergoing ileocolic resections for penetrating disease.

## IMMUNOSUPPRESSANT IMPACT ON COLECTOMY OUTCOMES IN CROHN'S DISEASE PATIENTS: A DOUBLE-EDGED SWORD?

P148

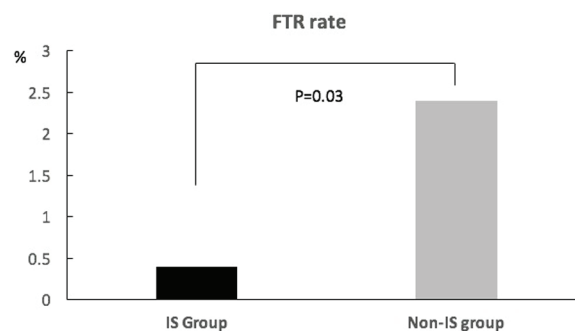
R. Fazl Alizadeh, S. Li, S. Sujatha-Bhaskar, R. Ray,  
M. Jafari, J. Carmichael, A. Pigazzi, M. Stamos  
Orange, CA

**Purpose/Background:** Inflammatory bowel disease (IBD) patients are frequently treated with immunosuppressant (IS) medications including corticosteroids and immunomodulators. The aim of this study was to assess impact of preoperative IS on short-term outcomes of colectomy in patients with Crohn's disease (CD).

**Methods/Interventions:** The National Surgical Quality Improvement Program (NSQIP) database targeted colectomy files were used to examine the clinical data of CD patients undergoing colectomy from 2012 to 2014. All disseminated cancer cases were excluded. Patients were divided into two groups based on use of IS (IS group and non-IS group). Within 30 days, demographic patient data, preoperative risk factors, and postoperative complications, and failure to rescue (FTR) rate (defined as mortality rate among patients suffering one or more postoperative complications) were reviewed for each of these cohorts.

**Results/Outcome(s):** 3139 patients were identified who fit our inclusion criteria [1125 (35.8%) patients in non-IS group and 2014 (64.2%) patients in IS group]. The mean age was  $39 \pm 16$  in IS group compared to  $44 \pm 17$  ( $p < 0.001$ ) in non-IS group. The mean length of stay was  $8.33 \pm 7.56$  days in IS group compared to  $8.17 \pm 7.18$  days in non-IS group ( $P = 0.30$ ). Following risk adjustment, patients with IS demonstrated no significant difference in mortality rate compared to patients without IS (0.1% vs. 0.5%,  $P = 0.08$ ). Also, FTR rate was significantly lower in IS group compared to non-IS group (0.4% vs. 2.4%, AOR:0.07,  $P = 0.03$ ). Serious morbidity rate was significantly higher in IS group compared to non-IS group (20.4% vs. 17.2%, AOR:1.29, CI:1.05-1.58,  $P = 0.01$ ). Also, patients in IS group had significantly higher anastomotic leak and unplanned readmissions compared to patients in non-IS group (5.2% vs. 3.5%, and 13.4% vs. 9.9%, respectively,  $P < 0.05$ ). Risks of venous thromboembolism and surgical site infections were significantly higher in IS group compared to non-IS group (AOR: 1.84, 1.35, respectively,  $P < 0.05$ ).

**Conclusions/Discussion:** The results of this study suggest that IS significantly increases serious morbidity, anastomotic leak and unplanned readmission rates in CD patients following colectomy. Surprisingly, IS appears to decrease short term mortality rate although statistical significance was not reached. Importantly, the IS group had an observed significantly decreased FTR rate. Our study demonstrated that use of IS in CD patients undergoing colectomy has risks (morbidity) but is not related to mortality.



### HOW ACCURATE IS ENDOSCOPIST PREASSESSMENT OF DIFFICULT POLYPS SCHEDULED FOR A DEDICATED POLYPECTOMY LIST? A SINGLE CENTER, SINGLE SURGEON SERIES.

P149

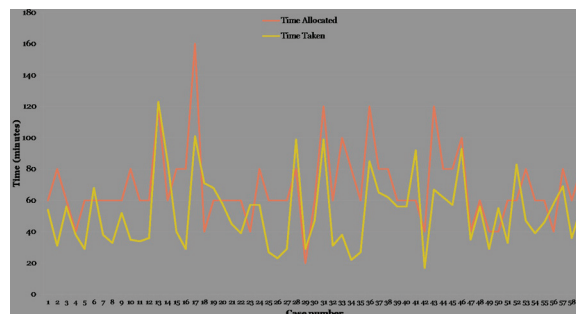
R. Padwick, B. Wild, S. Ward, M. Osborne  
Warwick, United Kingdom

**Purpose/Background:** Polyps seen at lower gastrointestinal endoscopy that are deemed to be 'difficult to remove' based on size/morphology/site/access/recurrence/number criteria are referred to a single surgeon endoscopist with an interest in removing such polyps on a dedicated 'difficult polyp list' at our Trust. These cases are allocated time slots based upon these criteria after case review by the endoscopist. We aim to establish how accurate the assessment process is based upon the information available.

**Methods/Interventions:** All patients who have undergone polypectomy on the 'difficult polyp list' from September 2014 to November 2016 were identified using local records. Data were collected regarding the time allocated per patient, polyp characteristics (size, morphology, site, ease of access), and length of procedure using locally kept electronic records and a locally designed proforma. All polypectomies were graded using the Size/Morphology/ Site/Access (SMSA) Criteria.

**Results/Outcome(s):** A total of 59 patients undergoing 69 'difficult polypectomies' were analysed. Main polyp size ranged from 2-60mm (median 30). Forty-two patients (71.2%) had polyps located in the left colon only, one patient (1.7%) had polyps on both sides of the colon. Forty-one of the 69 polyps were sessile (59.5%), 23 were pedunculated (33.3%) and 5 were flat (7.2%). Forty-three procedures (72.9%) were rated at least SMSA level III. Amount of time pre-allocated per procedure ranged from 20-160 minutes (median 60). Time per procedure ranged from 17-123 minutes (median 52). The discrepancy between time allocated and time taken ranged from 62 minutes too much time – 32 minutes too little time (median 18 minutes too much time), with 48 cases being allocated too much time (median 23 minutes). There was a weak correlation between the time allocated for the procedure and the actual procedure duration (Pearson's correlation coefficient  $r^2 = 0.55$ ) which was statistically significant ( $P < 0.01$ ).

**Conclusions/Discussion:** Evaluation of and subsequent allocation of time for polypectomy in 'difficult polypectomy' cases is very challenging, with high inter-patient variability. The tendency is towards allocating too much time. The reasons for this are almost certainly multifactorial, most commonly allowing time for patient turnaround between cases and attempting to avoid over-booking lists in order to avoid time pressure. The SMSA criteria does not allow for difficulty due to polyp recurrence.



### REMOVAL OF BENIGN COLON POLYPS – IS ENDOSCOPIC SUBMUCOSAL DISSECTION SUPERIOR TO LAPAROSCOPIC COLECTOMY?

P150

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**Purpose/Background:** A greater proportion of colon polyps found to be unresectable by standard endoscopy are now being removed via endoscopic submucosal resection (ESD). The aim of this study is to review the outcomes of ESD compared to laparoscopic colectomy at a single institution.

**Methods/Interventions:** A retrospective review of prospectively collected data was conducted on all patients undergoing ESD for benign colon polyps (excluding rectum) over an 18-month period by a single highly trained gastroenterologist. For comparison, we identified all laparoscopic colectomies for similar indications from 2012 to present. Peri-procedural variables were collected. Wilcoxon scores were used to create propensity matched mean scores.

**Results/Outcome(s):** There was no difference between the ESD (n=70) and laparoscopic colectomy (n=61) patients in terms of BMI and age, however ESD was more likely to have a higher ASA class III/IV (54% vs. 33%;  $p=0.028$ ). After propensity matching for ASA, ESD cases had a larger polyp size (50mm vs 23mm;  $p < 0.001$ ), shorter procedure duration (77 mins vs. 105 mins;  $p < 0.01$ ), shorter inpatient stay (24 hrs vs. 84 hrs;  $p < 0.001$ ), and less EBL (5mL vs 50mL;  $p < 0.001$ ). After matching for polyp size, the difference in procedure time was found to be 11 minutes, thus bearing no clinical or statistically significant difference ( $p=0.09$ ). Matching for polyp size did not change outcomes in other variables. Incidental or unsuspected adenocarcinoma was identified in 6% of ESD specimens (n=4) and 10% of LAP (n=6). Positive margins were present in 18.6% (n=13) of the ESD specimens, Perforation requiring emergent surgery occurred in 7.8% of ESD patients (n=5). In comparison, anastomotic leak occurred in 1.6% of colectomy patients (n=1).

**Conclusions/Discussion:** In this retrospective review ESD was associated with shorter hospital stay and procedure

duration at the cost of higher positive margins and more emergent operations. Further studies will be required to elucidate other important variables such as procedure cost, effect on quality of life, and long-term recurrence. This will help aid in decision making for patients, surgeons and endoscopists.

### A STANDARDIZED EDUCATION AND MONITORING PROTOCOL FOLLOWING ILEOSTOMY CREATION REDUCES HOSPITAL READMISSION.

P151

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O. Johansen, B. Tsai  
Indianapolis, IN

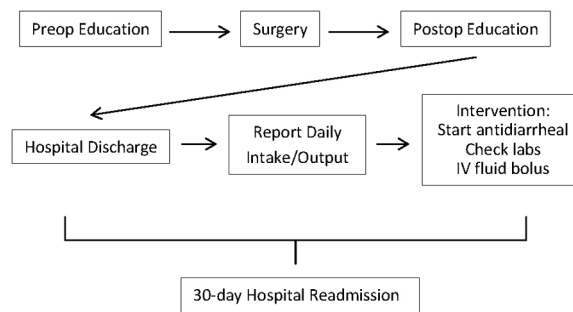
**Purpose/Background:** Ileostomy creation is commonly performed out of necessity or as a protective measure to prevent serious anastomotic complications. The morbidity of ileostomy can be high, leading to frequent hospital visits and readmission. As cost, complications, and hospital readmission are being used to judge our quality as physicians, we must be proactive in minimizing procedural morbidity. Standardized perioperative protocols focused on education, post-discharge monitoring, and early intervention may help decrease readmission following ileostomy creation. The purpose of this study was to monitor hospital readmission following institution of a standardized education and monitoring protocol for all patients having ileostomy creation (Figure).

**Methods/Interventions:** A standardized protocol for education and close monitoring of all patients undergoing surgery with ileostomy creation was instituted between January 2015 and April 2016. Adherence to each step of the protocol was monitored and 30-day readmission tracked. Data were analyzed with Fisher exact test or student's *t*-test ( $p < 0.05$  significant).

**Results/Outcome(s):** Thirty day readmission decreased following institution of the ileostomy monitoring protocol (22.3% vs. 36.0%,  $p = 0.02$ ). Adherence to the ileostomy monitoring protocol was inconsistent. Most patients (99.0%) were provided education materials and all (100.0%) met with ileostomy nurses postop, but only 61.2% had preop teaching and 64.1% of patients reported their daily intake/output after surgery. Of patients in the ileostomy monitoring protocol, those that reported their daily intake/output were readmitted half as often as patients that did not report (16.7% vs 32.4%). Preop and postop education did not affect hospital readmission. The most common diagnosis for readmission was dehydration (6.8%) followed by wound complications (4.8%), ileus/bowel obstruction (3.9%), and abdominal pain (2.9%).

**Conclusions/Discussion:** Close monitoring of intake and output following ileostomy creation can significantly decrease readmission rates. We speculate that continuous

communication between patient and treatment team leads to early intervention so that hospital-based treatment may be avoided. Even with a defined protocol in place, patient compliance can limit the effectiveness of any standardized plan.



Ileostomy education and monitoring protocol

### LAPAROSCOPIC RESECTION FOR COMPLICATED DIVERTICULITIS IS INCREASING NATIONWIDE.

P152

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Orlando, FL

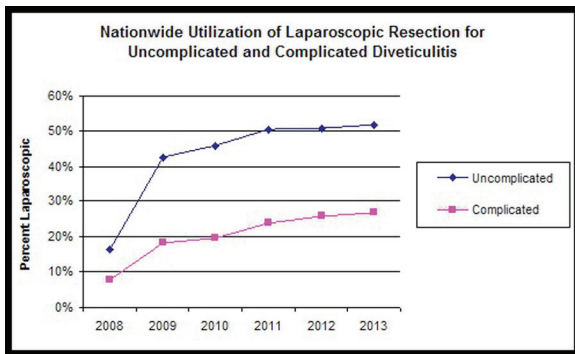
**Purpose/Background:** The use of laparoscopic resection for diverticulitis has become more widespread, though its use for complicated diverticular disease is not as well described. Our goal is to analyze recent nationwide trends in the use of laparoscopic sigmoid colectomy for patients presenting with abscess, generalized peritonitis, fistula, and obstruction.

**Methods/Interventions:** The Nationwide Inpatient Sample (NIS) database was used to identify patients with diverticulitis who underwent a sigmoid colectomy in the United States from 2008 through 2013. The utilization of laparoscopy was analyzed for patients with and without complicated diverticular disease. Mortality, ureteral injury, hospital length of stay, and total hospital charges were compared.

**Results/Outcome(s):** During the study period, the percent of resections for complicated diverticulitis performed laparoscopically increased dramatically from 8.0% in 2008 to 26.7% in 2013. Laparoscopic resections also increased for uncomplicated diverticulitis (16.4% to 51.7%). Analyzed separately, laparoscopic resection was increasingly utilized for patients presenting with abscess, generalized peritonitis, fistula, and obstruction. The rate of conversion to an open procedure was higher for patients with complicated disease (15.4% vs. 32.0%). Compared to open surgery, patients undergoing laparoscopic resection for complicated disease had a lower mortality (0.4% vs. 3.0%,  $p < 0.001$ ). The rate of ureteral injury was lower in the laparoscopic group (0.1% vs. 0.3%,  $p < 0.001$ ), and there was no difference with regards to overall intraoperative

iatrogenic injury (3.4% vs. 3.0%,  $p=0.073$ ). Patients who underwent laparoscopic resection for complicated disease, including those patients converted to open surgery, had a lower median total hospital charge when compared to open surgery (\$61,197 vs. \$73,232) and a lower median hospital length of stay (7 days vs. 10 days).

**Conclusions/Discussion:** Laparoscopic sigmoid colectomy is increasingly utilized for both complicated and uncomplicated diverticular disease. While conversion to open is more likely for complicated diverticulitis, patients attempted laparoscopically have an overall lower mortality, lower rate of ureteral injury, shorter hospital length of stay and lower total hospital charges when compared to open surgery.



Complicated disease includes patients with abscess, generalized peritonitis, fistula, and obstruction. The percent of patients who underwent laparoscopic resection includes patients converted to an open procedure.

### COLONIC DIVERTICULITIS: AN ENTIRELY DIFFERENT CONDITION AMONGST ASIANS.

P153

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**Purpose/Background:** Right sided colonic diverticulitis is rarely encountered amongst the Western population. Emerging studies continue to highlight the differences in characteristics and outcomes of colonic diverticulitis amongst Asians. This study aims to evaluate our experience in the management of diverticulitis in an Asian population.

**Methods/Interventions:** A retrospective review of all patients admitted for acute colonic diverticulitis from January 2012 to September 2014 was performed. The confirmation of diverticulitis was based on radiological, endoscopic or surgical findings. The severity of diverticulitis was graded using the modified Hinchey Classification.

**Results/Outcome(s):** A total of 182 patients were admitted for diverticulitis during the study period. Amongst them, 60.4% ( $n=110$ ) had right sided disease while 39.6% ( $n=72$ ) had left sided disease. Most patients ( $n=168$ ) had mild diverticulitis on presentation (modified Hinchey score 1b and below), while 8 patients had Hinchey 3 ( $n=6$ ) or

Hinchey 4 ( $n=2$ ) diverticulitis. When comparing between those with right sided diverticulitis and those with left sided diverticulitis, those with left sided diverticulitis were generally older (median of 51 vs. 67 years of age,  $p<0.001$ ), were admitted more than once for diverticulitis ( $p<0.001$ ), had worse severity of diverticulitis ( $p=0.02$ ) and underwent surgical intervention more readily (left side,  $p=0.003$ ). A total of 20 patients underwent surgery, six had right sided diverticulitis and 14 had left sided diverticulitis ( $p=0.003$ ). Five of the six patients with right sided diverticulitis were operated for clinical suspicion of appendicitis, while all the patients with left sided diverticulitis who underwent surgery were operated for acute abdomen or non-resolving symptoms. The severity ( $p=0.001$ ) and location (left side,  $p=0.003$ ) of diverticulitis were significant predictors of surgical intervention.

**Conclusions/Discussion:** Asian patients with diverticulitis differ greatly from the Western population. The disease tends to be right sided, occurring in younger patients and were of milder severity, and often mimics appendicitis. There is the need to educate clinicians worldwide of this association amongst Asians because of ever changing demographic shifts in the proportion of Asians in Western countries.

### CHALLENGES FOLLOWING ILEOSTOMY CREATION IN OLDER ADULTS.

P154

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**Purpose/Background:** As the general population ages, older individuals make up a growing proportion of surgical patients. Many surgeons hesitate to create ileostomies for older patients out of concern that these patients may be predisposed to increased rates of complications or face challenges in self-care. Given these concerns, we sought to determine if older age ( $\geq 65$  years) was predictive of readmission or poor self-efficacy in the setting of a modern, patient-centered ileostomy pathway.

**Methods/Interventions:** We retrospectively evaluated patients managed under our perioperative pathway including stoma site marking and ostomy nurse led education sessions (2013-2016,  $n=354$ ). Univariate analysis was performed to identify factors significantly associated with readmission. These factors were integrated into hierarchical logistic regression models to determine predictors of readmission for the entire cohort of patients and compare them to specific factors for older ( $n=70$ ) and younger ( $n=284$ ) patients. In a sub-set of these patients, psychosocial adaptation and self-efficacy were prospectively evaluated by administering a validated survey (PAIS-SR, Bekkers et al. 1996) at one- and three-months following ileostomy creation (2015-2016,  $n=49$ ).



**Results/Outcome(s):** Of the 354 patients identified during the study period, 99 (28%) were readmitted within 30 days of their operation, with no significant differences in rates between older and younger patients (younger = 25%, older = 35%,  $p = 0.14$ ). Indications for operation varied between age groups, with older patients predominantly undergoing operations for cancer or diverticulitis. Multivariable logistic regression using the entire cohort identified higher ASA score and prolonged length of stay as predictors of readmission but not age. In contrast, factors predicting readmission for older patients included higher ASA score and discharge on anti-motility agents or diuretics. Analysis of stoma care self-efficacy revealed no significant differences between younger and older patients at one-month follow up (mean score: younger =  $81.4 \pm 14.8$  vs older =  $79.3 \pm 14.3$ ,  $p = 0.69$ ). However, at three-month follow up, older patients demonstrated significantly lower self-efficacy scores relative to younger patients (mean score: younger =  $94.8 \pm 16.4$  vs older =  $74.9 \pm 7.0$ ,  $p = 0.004$ ) and did not demonstrate improvement in self-efficacy when compared to one-month follow up.

**Conclusions/Discussion:** Older adults appear to have different risk factors for readmission after ileostomy creation. Although they fare equally in caring for their new ileostomies at one-month follow up they then become less independent by 3 months. Our data demonstrates that ileostomy care pathways need to be tailored to the needs of older patients and that older adults would likely benefit from secondary education interventions to improve long-term self-efficacy following ileostomy creation.

### BOWEL HABITS AND GENDER CORRELATE WITH PROXIMAL COLON LENGTH MEASURED BY CT COLONOGRAPHY.

P155

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Aizuwakamatsu, Japan; Nagasaki, Japan; Sapporo, Japan; Shimotsuke, Japan; Chuo-ku, Japan

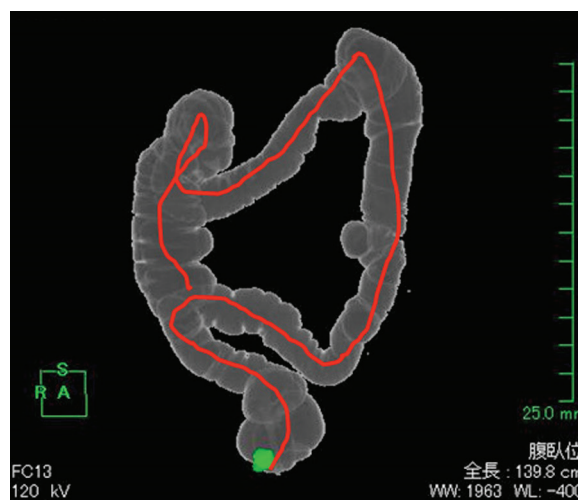
**Purpose/Background:** Colonoscopists recognize that bowel habits correlate with colon length. CT colonography enables measurement of the true colon length by reconstructing three-dimensional images. The aim of this study is to investigate the relationship between colon length and bowel habits.

**Methods/Interventions:** Data obtained from a previous multi-center trial (UMIN Clinical Trials Registry number UMIN000006665) including 321 subjects with positive fecal immunochemical testing who underwent CT colonography were reviewed. After excluding patients with poor bowel preparation, a history of bowel resection and advanced cancer, 295 subjects (mean age  $58.1 \pm 11.1$  years, range 40-83 years; female 141, male 154) were enrolled. Colon length was measured using a computer-generated

center line of the colorectum (as shown in the Figure), and it was divided at the iliac crest level into the distal (recto-sigmoid) and proximal colon (from cecum to descending colon). Bowel habits were classified into three categories according to frequency of bowel movements including A, daily; B, once every two or three days; and C, less than once in three days. Mean colorectal length was compared among the bowel habit categories. Patient characteristics, age, gender, body height, body mass index and history of laparotomy, were also evaluated among the three groups. Statistical comparison was made using one-way ANOVA with Bonferroni correction for multiple comparisons.

**Results/Outcome(s):** The entire colon in group A was significantly shorter (cm) than in groups B and C (A:  $147.4 \pm 17.9$ , B:  $154.7 \pm 18.5$ , C:  $158.6 \pm 18.3$ ; A vs. C:  $p=0.002$ ; A vs. B:  $p=0.014$ , B vs. C:  $p=0.877$ ). Colon length in females is significantly longer than in males (female  $154.3 \pm 18.1$ , male  $147.1 \pm 18.3$ ;  $p=0.0008$ ). Colon length showed trends associated with age ( $p=0.181$ ) and laparotomy history ( $p=0.14$ ). Multiple linear regression analysis showed significant differences in bowel habits (A vs. B+C,  $p=0.003$ ) and gender ( $p=0.022$ ). On subgroup analysis there is no significant difference in distal colon length. In contrast, the proximal colon in group A is significantly shorter than group C (A:  $88.2 \pm 12.6$ , B:  $92.0 \pm 12.8$ , C:  $96.3 \pm 12.8$ ; A vs. C:  $p=0.001$ ; A vs. B:  $p=0.097$ , B vs. C:  $p=0.29$ ). The proximal colon in females is significantly longer than in males (female  $92.9 \pm 12.4$ , male  $87.6 \pm 12.9$ ;  $p=0.0003$ ). Multiple linear regression analysis showed significant differences in bowel habits (A vs. B+C,  $p=0.013$ ) and gender ( $p=0.008$ ).

**Conclusions/Discussion:** This study demonstrates that bowel habits and gender correlate with overall colon length, in particular, of the proximal colon measured by CT colonography. This observation warrants further investigation.



**THE POTENTIAL DELETERIOUS EFFECT OF THE SURGICAL CARE IMPROVEMENT PROGRAM ON THE RISK OF CLOSTRIDIUM DIFFICILE AFTER COLORECTAL RESECTION.**

P156

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**Purpose/Background:** The Surgical Care Improvement Program (SCIP) was introduced in 2005 to improve the surgical mortality and morbidity in healthcare organizations with pre-operative antibiotics as one of the major components. While the program was retired in 2015, valuable lessons can potentially be learned from the impact of this concerted initiative on the use of antibiotics on the incidence of Clostridium difficile infections (CDI) in post-operative patients.

**Methods/Interventions:** We used the Nationwide Inpatient Sample (NIS) national registry dataset for 1999 to 2012. International Classification of Diseases, 9th

Revision, Clinical Modification (ICD-9-CM) codes were used to identify subjects undergoing colorectal resection. Surgical inpatient discharge data of pre-SCIP (1999-2005) and SCIP (2006-2012) groups were compared for demographics, hospital characteristics, surgical procedure, length of stay (LOS), total charges, occurrence of CDI and mortality for patients with CDI. Univariate analysis included chi-square contingency table analysis or the Student t-test. Multivariate regression analysis was used to determine high-risk characteristics.

**Results/Outcome(s):** Of 353,772 patients with colorectal resection, 158,470 were pre-SCIP and 195,302 SCIP. Pre-SCIP and SCIP patients had similar gender and race but pre-SCIP patients were younger (72 vs. 69 years,  $p=0.003$ ). More pre-SCIP patients had colorectal malignancy, other diagnoses were similar. Procedures performed were similar. Median length of stay (pre-SCIP: 13 days vs SCIP: 11 days) and discharge disposition were similar but costs were significantly greater in the SCIP group (pre-SCIP \$45,351 vs SCIP \$68,090,  $p < 0.001$ ).

## P156

	Pre SCIP (1999 – 2005)		SCIP (2006 – 2012)		p Value	SD
	N/Mean	%/SD	N/Mean	%/SD		
Sample Size	656		1,378			
Age (median)	72		69		0.0003	16.9
Female	359	54.7%	725	52.6%	0.37	4.2
Co-morbidity score (median)	4		5		0.73	1.9
	APR-DRG risk of mortality					
1 - Minor likelihood of dying	119	26.1%	394	28.5%	0.31	5.5
2 - Moderate likelihood of dying	154	33.8%	424	30.8%	0.22	6.5
3 - Major likelihood of dying	103	22.6%	330	23.9%	0.57	3.1
4 - Extreme likelihood of dying	79	17.4%	230	16.7%	0.74	1.8
Routine Discharge	320	48.8%	668	48.5%	0.89	0.6
Post-acute care Discharge	295	44.9%	661	47.9%	0.20	6.0
Other	41	6.2%	49	3.6%	0.006	12.5
Index admission cost (average)	\$67,407	\$71,695	\$102,191	\$112,151	<.0001	36.9
Median	\$45,351		\$68,090			
Length of Stay (average)	16.5	12.7	14.8	11.4	0.004	13.9
Median	13		11			
Deaths after having secondary diagnosis as C. Diff	40	6.1%	47	3.4%	0.005	12.6
Open Resection	561	85.5%	877	63.6%	<0.0001	51.9
Colostomy	11	1.6%	23	1.7%	0.99	0.06
Ileostomy	3	0.4%	9	0.6%	0.59	2.6
Rectal	69	10.5%	149	10.8%	0.84	0.9
Benign colorectal disease	69	10.5%	179	12.9%	0.11	7.7
Malignant colorectal disease	322	49.1%	600	43.5%	0.019	11.1
Inflammatory bowel disease	25	3.8%	72	5.2%	0.16	6.81
Diverticular disease	138	21.0%	337	24.5%	0.09	8.2
Obstruction or functional disorder	33	5.0%	46	3.3%	0.06	8.4
Rectal Prolapse	11	1.7%	27	1.9%	0.67	2.1
Other diagnosis	58	8.8%	117	8.5%	0.79	1.2

2,034 (0.57%) patients had CDI (pre-SCIP: 656 patients (0.41%) and SCIP: 1,378 patients (0.7%),  $p < 0.001$ ). Although rate of CDI increased from 0.2% in the pre-SCIP to 0.7% in the SCIP group, there were fewer deaths from CDI in the SCIP group as when compared with pre-SCIP ( $n=47$ , 3.4% vs.  $n=40$ , 6.1%,  $p = 0.0051$ ).

**Conclusions/Discussion:** Clostridium difficile infection rates increased during the Surgical Care Improvement Program. Further, length of stay remained the same and costs increased. The drop in mortality from CDI may reflect our better management of the condition despite the increased incidence. These data highlight the negative impact of blanket policies designed to improve and monitor quality and stress the need for patient-centered initiatives.

### COLONOSCOPY SIMULATION: CRITERION VALIDITY USING DIRECT OBSERVATION OF PROCEDURAL SKILLS.

P157

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**Purpose/Background:** Colonoscopy is a widespread practice, both as a diagnostic and therapeutic tool, with an estimated 1.7 million performed in North America for screening purposes alone in 2015. There is evidence that expert performance in colonoscopy is not reached until a threshold of 500 procedures are performed. Most, if not all, of this training is currently performed on real patients. This has adverse effects such as increased discomfort for patients, as well as training being labour and time intensive, with an increase of procedure time of 10-37% reported for training colonoscopies. Virtual reality simulation has many potential benefits in the area of colonoscopic training, although its application to real-life training has not been studied extensively. In particular, criterion validity, or the ability to predict current or future performance has not been established for virtual reality colonoscopy. This study aims to establish criterion validity for virtual reality colonoscopy through the use of a direct observation of procedural skill (DOPS) instrument.

**Methods/Interventions:** Ethics approval was granted for this project. Ten participants were prospectively recruited into the study. Demographic data, including prior simulation and colonoscopy experience was collected. Each participant performed two virtual-reality and two real-life screening colonoscopies which were video-recorded, and simulation metric data was collected. These recordings were then assessed using a modified Joint Advisory Group colonoscopy DOPS form, by an impartial observer blinded to the identity of the endoscopist. This data was then cross-matched with each participant. Two one-sided equivalence tests were performed on simulated and real-life DOPS scores, with an equivalence level set at 4 points.

T-tests were performed to analyse simulator metric data. Statistical significance was deemed at  $p < 0.05$ .

**Results/Outcome(s):** There was equivalence in DOPS mean scores across simulated and real-life colonoscopy (21.3 vs 20.9, 95% CI -3, 2.5). Real-life DOPS scores also significantly correlated with some simulator metrics, including total procedure time, level of simulated patient discomfort, and total percentage time in 'red-out' (where the colonoscope was pressed against the lumen of the virtual colon).

**Conclusions/Discussion:** This is the first study to investigate criterion validity for virtual reality simulation, in which the EndoVR was validated against real-life performance of screening colonoscopy. This reinforces the use of virtual reality colonoscopy in the teaching and training of endoscopists. It also opens up the possibility of the use of virtual reality colonoscopy in both accreditation and re-accreditation. The utility of the simulator for the use of more complex scenarios is an avenue of further investigation. Further studies are required on different scenarios, with a larger and more varied number of participants.

### LAPAROSCOPIC LOOP ILEOSTOMY REVERSAL WITH INTRACORPOREAL ANASTOMOSIS IS ASSOCIATED WITH SHORTER LENGTH OF STAY WITHOUT INCREASED DIRECT COST.

P158

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**Purpose/Background:** Loop ileostomy reversal has predominantly been performed in an open fashion by the surgical community. With the growth of minimally invasive surgery, laparoscopic intracorporeal anastomosis has become more common, potentially offering advantages of earlier return of bowel function and reduced postoperative pain. Over the past four years, surgeons at our institution have routinely incorporated the novel technique of laparoscopic ileostomy reversal with intracorporeal or extracorporeal anastomosis in their practice. In this study, we aim to compare the outcome and cost of these approaches with open ileostomy reversal.

**Methods/Interventions:** Retrospective review of sequential patients undergoing elective loop ileostomy reversal between 2013-2016 at a single high-volume institution was performed. Patients were stratified on the basis of operative approach: open reversal (OP), laparoscopic-assisted reversal with extracorporeal anastomosis (LE), and laparoscopic reversal with intracorporeal anastomosis (LI). Direct hospital costs were determined for each approach. Linear and logistic regressions were utilized to perform multivariate analysis and determine risk-adjusted outcomes.

**Results/Outcome(s):** Of 132 sequential cases of loop ileostomy reversal, 50 (38%) underwent OP, 49 (37%) underwent LE, and 33 (22%) underwent LI. Demographic data and preoperative comorbidities were similar between the three cohorts with exception to CHF which was more prevalent among LI cases compared to LE and OP (6.1%, 0%, 0%), ( $p < 0.05$ ). The most common antecedent indication for fecal diversion was prior proctectomy for rectal cancer in all three groups. Median length of stay was equivalent between OP (69.0 hrs) and LE (69.6 hrs,  $p = 0.43$ ) but significantly shorter for LI (52.1 hrs,  $p < 0.05$ ). Median length of operating time was longer for LI (175.5 minutes) compared to OP (129 minutes), ( $p < 0.05$ ). Rates of post-operative 30-day complications were statistically equivalent among the three cohorts, (OP 2%, LE 10.2%, LI 3.0%  $P < 0.152$ ). Direct hospital cost was statistically similar for LI (\$7,620.13) compared to OP (\$7,524.80), ( $p = 0.71$ ).

**Conclusions/Discussion:** Laparoscopic ileostomy reversal with intracorporeal anastomosis was associated with shorter length of stay without an overall increase in direct cost. This technique of laparoscopic ileostomy reversal warrants continued study in a randomized clinical trial.

#### THE STOMA STUDY: SKIN TO ORIGIN OF MESENTERIC ARTERY A PROSPECTIVE OBSERVATIONAL CT STUDY.

P159

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**Purpose/Background:** Convention places stomas within an *ostomy triangle*, bounded by the umbilicus, anterior superior iliac spine and pubis. There is little anatomical justification for this position compared to other sites (particularly in the context of the obesity epidemic). To maximise length the bowel can be mobilised to the **Inferior Border of the Pancreas (IBP)**. The aim of the study was to anatomically describe an improved location for stomas based on stoma site distances from the **Superior Mesenteric Artery (SMA)** as it passes the IBP: panniculus thickness; and to describe umbilical relation to boney landmarks with changing Body Mass Index (BMI).

**Methods/Interventions:** Height and weight (to calculate BMI) were obtained from patients undergoing abdominal CT scans at a single university radiology practice. From manipulation of raw CT data the following distances were measured 1: **SMA at the IBP** to both the skin of a mid-rectus **upper abdominal stoma site (UASS)** and a right lower quadrant **traditional stoma site (TSS)**; 5cm lateral and 4cm inferior to the umbilicus 2: **Panniculus thickness** at the UASS and TSS 3: **Xiphoid to Umbilicus (XTU)** and **Umbilicus to Pubis (UTP)**, expressed as a ratio

**Results/Outcome(s):** 277 subjects were recruited. There were 142 Men BMI range 17.3 – 54.0; mean 28.0 kg/m<sup>2</sup> In all subjects the distance from the IBP to the TSS was longer than IBP to the UASS, the median difference in distance was 5.6cm (range 0.7-11.9cm). The ratio **XTU/UTP** (reflecting umbilical relation to midline boney structures), was a better predictor of this length discrepancy than BMI when looking at the difference between IBP to TSS and IBP to UASS ( $R^2$  0.32 vs 0.06). XTU/UTP has a weak linear association with BMI ( $R=0.357$ ) The difference in panniculus thickness at the TSS compared to the UASS (range -0.8 - 7.3cm; mean 1cm) has a significant linear relationship to BMI and gender; increasing with BMI ( $R^2=0.34$ )

**Conclusions/Discussion:** This study, focusing on anatomical distances of stoma formation, is the first of its kind. Stoma creation is a task surrounded by traditional dogma. Creating stomas by default in the lower quadrants is often not appropriate, especially in obese patients. The results have shown that the umbilicus is a mobile landmark, across the population, moving closer to the pubic bone as BMI increases. The umbilicus as a landmark for stoma siting is inappropriate. Siting stomas in the upper abdomen may be well suited to many patients as the distance from the blood supply (SMA) to a stoma is always shorter here than at the TSS. Similarly the UASS with its thinner panniculus, in overweight patients, also adds to the ease of stoma formation. BMI was not a strong predictor of increasing length discrepancy when comparing SMA distance to upper and lower stoma sites, indicating that BMI is a poor predictor of central adiposity. In obese patients an upper abdominal stoma site level with the inferior border of the pancreas will be the easiest place to form a stoma.

#### THE IMPACT OF INTESTINAL RESECTION FOR BENIGN COLORECTAL POLYPS ON PATIENT-REPORTED QUALITY OF LIFE AND HEALTH STATUS.

P160

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**Purpose/Background:** Patient-reported outcomes on health status and quality of life can be used to assess response to surgical interventions. Although frequently studied for patients with colorectal cancer, there are currently no studies assessing patient-reported outcomes following intestinal resection for benign colorectal polyps not amendable to endoscopic therapy or local excision. The purpose of this study was to assess the impact of bowel resection for benign polyps on patient-reported health outcomes.

**Methods/Interventions:** Patients undergoing a colon or rectal resection for a benign polyp completed pre- and post-operative surveys on health status and symptoms between 2012 and 2016. Patients completed the survey tools following placement on the surgical wait list and six months after surgery. The survey tools completed included a general health questionnaire (EQ-5D, max score 1.0) which incorporates an overall health status visual analog scale (VAS, max score 100), a pain scale (PEG-3, max score 10), and a depression questionnaire (PHQ-9, max score 27). Survey tool scores before and after surgery were compared using paired samples t-tests.

**Results/Outcome(s):** Forty-one patients submitted pre- and post-operative surveys. All patients underwent a bowel resection including right hemicolectomy (N=17), left hemicolectomy (N=2), anterior resection (N=13), abdomoperineal resection or proctocolectomy (N=7), or total colectomy (N=2). Twenty-four procedures were completed laparoscopically. Patients generally had good pre-operative health status scores and minimal symptoms. There were no significant differences in scores before and after surgery for any of the four survey tools (see table). Overall health status measured by the VAS improved following surgery.

**Conclusions/Discussion:** Surgical intervention for benign polyps does not significantly impact overall health status six months after surgery as measured by the EQ-5D, PEG-3 and PHQ-9 tools. This is the first study to examine patient-reported health status outcomes for patients undergoing a major intestinal resection for benign colorectal polyps. Patients undergoing bowel resection can be counselled that their quality of life is likely to remain stable following surgery.

possibility of performing different procedures that impact both quality of life and/or survival. The operation chosen must balance the choice between the impact on survival and the quality of life. The aim of this study was to perform a decision analysis to help quantify the tradeoffs between total proctocolectomy with ileal pouch-anal anastomosis (IPAA) versus total colectomy with ileorectal anastomosis (IRA).

**Methods/Interventions:** We created a disease simulation Markov model (TreeAge DATA Pro, Williamstown, Mass) to simulate the clinical events following IPAA and IRA for rectal sparing FAP in cohort of individuals at the age thirty. We utilized available literature to obtain different transition probabilities and health-states utilities. The output parameters were quality-adjusted-life-years (QALY) and life years (LY). Deterministic and probabilistic sensitivity analyses were performed.

**Results/Outcome(s):** Our model showed that in base-case analysis mean QALY's for IPAA was 38.81 and for IRA was 41.51. Mean LY's for IPAA was 44.28 and 43.20 for IRA. One way sensitivity analysis was performed for all the parameters in the model. None of the deterministic sensitivity analyses changed the model results across the range of plausible values. Probabilistic analysis identified that in 88.9 percent of scenarios IRA had improved QALY's compared with IPAA.

**Conclusions/Discussion:** In our model IRA was found to be preferable for patients with rectal sparing FAP when quality of life is taken into consideration. The model was robust based on both deterministic and probabilistic sensitivity analysis, and this data should be taken into consideration when counseling the patients regarding surgical options in rectal sparing FAP.

#### A DECISION ANALYSIS FOR RECTAL SPARING FAMILIAL ADENOMATOUS POLYPOSIS: TOTAL COLECTOMY WITH ILEORECTAL ANASTOMOSIS VERSUS PROCTOCOLECTOMY WITH ILEAL POUCH-ANAL ANASTOMOSIS.

P161

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**Purpose/Background:** Surgical management of rectal sparing familial adenomatous polyposis (FAP) creates the

#### P160 Pre- and post-operative health status scores

Survey Instrument	Pre-operative score (mean standard $\pm$ deviation)	Post-operative score (mean $\pm$ standard deviation)	p-value
EQ-5D (/1.0)	0.85 $\pm$ 0.12	0.87 $\pm$ 0.15	0.15
VAS (/100)	75.05 $\pm$ 16.32	77.75 $\pm$ 12.13	0.08
PEG-3 (/10)	1.94 $\pm$ 2.10	1.50 $\pm$ 1.92	0.24
PHQ-9 (/27)	3.54 $\pm$ 3.68	3.02 $\pm$ 2.38	0.30

## INVESTIGATING THE ROLE OF SURGICAL TRAUMA IN THE PATHOGENESIS OF DESMOID TUMOR FORMATION IN FAMILIAL ADENOMATOUS POLYPOSIS USING A NOVEL MURINE MODEL OF DESMOID TUMOR.

P162

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**Purpose/Background:** Patients with familial adenomatous polyposis (FAP) are at increased risk of colorectal carcinoma and thus undergo prophylactic colectomy. Desmoid tumors are locally invasive clonal proliferations of myofibroblasts that are the largest cause of mortality in FAP patients who have undergone prophylactic colectomy. Surgical trauma is a clear risk factor in the development of desmoid disease, with the majority of desmoid tumors occurring following prophylactic colectomy. It has been suggested that laparoscopic prophylactic colectomy increases the risk of desmoid tumor in FAP when compared to an open approach. There is a need for a pre-clinical model of abdominal desmoid tumor in FAP to allow experiments to investigate the role of surgical trauma in the formation of desmoid tumors.

**Methods/Interventions:** The  $Apc^{min/+}$  mouse is an established murine model for FAP. Mutations in p53 have been implicated in the formation of desmoid tumors. By crossing  $Apc^{min/+}$  mice on a p53 KO background investigators have developed a line of desmogenic mice, the  $Apc^{min/+};p53^{-/-}$  mice. Desmoid tumors from the  $Apc^{min/+};p53^{-/-}$  mice have been validated with histopathology and immunohistochemistry. The  $Apc^{min/+};p53^{-/-}$  mouse model is being utilized to investigate the role of laparoscopic surgery in the pathogenesis of desmoid tumors, by subjecting these desmogenic mice to laparoscopic and open surgery. Mice undergo a general anesthetic for one-hour duration and are subjected to peritoneal trauma through laparotomy, humidified-warm laparoscopy or cold-dry laparoscopy. There is a control group of mice that undergo a general anesthetic but no surgical intervention. Mice are monitored in the post-operative period and culled when they meet ethical endpoints or reach 8 weeks following surgery. Desmoid tumors identified are processed for histopathology, immunohistochemistry and scanning electron microscopy.

**Results/Outcome(s):** The  $Apc^{min/+};p53^{-/-}$  mice develop on average 25 abdominal wall desmoid tumors. Histopathology reveals a spindle cell neoplasm with a myxoid appearance consistent with desmoid tumor morphology. Immunohistochemistry demonstrates positive staining for beta-catenin and COX-2, and negative staining for ER $\alpha$ , as seen in human desmoid tumors. (As shown in figure 1) Laparoscopic and open surgery experiments on the desmogenic  $Apc^{min/+};p53^{-/-}$  mice will allow

investigators to determine if laparoscopic surgery alters the risk of desmoid tumor formation in the FAP population.

**Conclusions/Discussion:** The  $Apc^{min/+};p53^{-/-}$  mouse is a novel mouse model to facilitate the biomechanical study of desmoid tumors associated with familial adenomatous polyposis. This murine model enables experiments to investigate surgical factors involved in desmoid tumor formation.

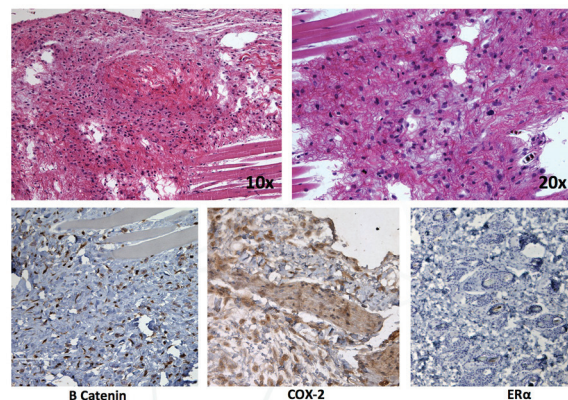


Figure 1:  $Apc^{min/+};p53^{-/-}$  desmoid tumour histology and immunohistochemistry

## COMPARING CECAL AND RECTAL NEOPLASMS: CLUES TO BIOLOGY?

P163

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**Purpose/Background:** The cecum and the rectum are chambers at opposite ends of the large intestine, where the cecum acts as a sump and the rectum is the organ of defecation. They receive very different types of stool. These differences and similarities offer opportunities to explore the relationship between biology and neoplasia. We examined the types of neoplasms found in these chambers to see if there were clues to the cause of the commonly noticed increase in incidence of young patients with rectal cancer.

**Methods/Interventions:** A prospectively maintained database from a tertiary referral institution was queried to identify neoplasms in the cecum and rectum. We accessed data regarding family history and characteristics of the neoplasms.

**Results/Outcome(s):** 3082 polyps were identified: 1674 in the cecum (C) and 1408 in the rectum (R). There were 300 serrated polyps (33% SSP) and 1074 adenomas in the cecum; 766 serrated polyps (2.6% sessile serrated polyps (SSP) and 423 adenomas in the rectum. Mean ages of patients were  $67.4 \pm 10.4$  years (C) and  $63.9 \pm 11.6$  years (R), with identical gender distribution (61.7% men). Adenoma data are shown in the table. There were significant differences between cecum and rectum in polyp number, shape and pathology. A positive family history for colorectal cancer was found in 34% and 30% of patients

with cecal and rectal hyperplastic polyps respectively, but in 77% and 26% of patients with cecal and rectal adenomas.

**Conclusions/Discussion:** The rectal mucosal milieu reflects common KRAS mutations and rare methylation; adenomas occurring in this environment advance rapidly. The cecal milieu is one with less frequent BRAF mutations and more common methylation, where adenomas are more common but less aggressive. The multiplicity of cecal adenomas suggests a field effect likely due to familial factors. These different phenotypes may be related to differences in genome, microbiome, stool chemistry, or characteristics of the epithelium.

### PROGNOSTIC IMPACT OF ASCITIC CEA AND ELASTIC LAMINA DEFECT IN COLON CANCER PATIENTS.

P164

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**Purpose/Background:** The level of carcinoembryonic antigen(CEA) in ascites are associated with cancer free survival, overall survival and peritoneal carcinomatosis, and ascitic CEA could be a helpful test in detecting malignancy-related ascite given the limited sensitivity of cytology. The exact mechanism of increased ascites CEA in peritoneal carcinomatosis is not known. Direct microscopic tumor seeding and lymphatic drainage may be considered, but the evidence for this is lack. Peritoneal elastic lamina is normally located in intestinal wall and histologically can be visualized by elastic staining. Recently, studies showed that node-negative patients with elastic laminal invasion have a similar recurrence rate compared with node-positive patients in T3,pT4a colon cancer. This study aimed to investigate the clinical impact of ascitic tumor marker and elastic lamina invasion, and the association between ascitic tumor maker and elastic lamina invasion in T3 colon cancer without risk factors. We suggest the role of adjuvant chemotherapy in T3 colon cancer with low risk with elevated ascitic tumor marker, and find a mechanism of elevated ascitic tumor marker.

**Methods/Interventions:** From 2006 to 2014, 160 patients who underwent surgery for T3N0M0 colon cancer were consecutively enrolled at Yeouido St. Mary's Hospital. The patients with lymphatic invasion (n=16, 10%), vascular invasion(n=6, 3.8%) and neural invasion(n= 22, 13.8%) were excluded for they could be a metastatic route. In 119 patients, 102 patients were included with ascitic cytology and ascitic tumor marker. In 82 patients (Stage II Low risk group) without obstruction (n=12, 11.8%) and poor differentiation(n=8, 7.8%), survival analysis was performed.

**Results/Outcome(s):** Elevated ascitic CEA showed significant association with effusion, Lt. colon cancer, elastic lamina defect in univariable and multivariable analysis. Elastic lamina defect showed significant association with ascitic CEA in univariable and multivariable analysis (p=0.004), but no association with other factors including ascitic CA19-9 (p=0.626). In low risk group, the patients whose ascitic CEA were elevated tend to have poor disease free survival(DFS) (p=0.026), but have no association with overall survival(OS) (p=0.850). Elastic lamina defect was not associated with increase in DFS (p=0.504) and OS (p=0.387). There was no differences in the DFS and OS. OS were significantly better in chemotherapy groups (p<0.001), but there were no significant differences in DFS (p=0.779).

**Conclusions/Discussion:** Ascitic CEA could be elevated in low risk T3 colon cancer patients, and elevated ascitic CEA tend to be increased in elastic lamina defect and DFS. Patients receiving adjuvant chemotherapy showed significant cancer specific survival benefit. We suggest that adjuvant chemotherapy should be considered for patients with elevated ascitic CEA level in low risk T3 colon cancer.

**P163 Table. Characteristics of patients with adenomas, and their polyps**

Variable	Cecum (1074)	Rectum (423)	p-value
Size, mm	7.9 ±10.4	11.9 ± 16.9	0.004*
Age, years old	67.4 ± 10.4	63.9 ± 11.6	0.0004**
Gender, male	663 (61.7%)	261 (61.7%)	0.9915***
Advanced Adenomas	240 (22%)	132 (31%)	0.0004***
High Grade Dysplasia	34 (3.2%)	31(7.3%)	0.0004***
>25% villous	108 (11.2%)	104 (24.8%)	0.001***

\*Mann Whitney U, \*\* t test, \*\*\* Chi Square

**PLASMA MICRORNA 135 B : DIAGNOSTIC BIOMARKER AND PREDICTS LYMPH NODE STAGE IN COLORECTAL CANCER PATIENTS.**

P165

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**Purpose/Background:** Colorectal cancer is the third commonest cancer with nearly 1.4 million new cases identified throughout the world in 2012 with survival rate of 70% with lymph node spread. There is a pressing need for new noninvasive blood based test to improve early detection and monitoring of CRC. MiRNAs are small non-coding RNAs involved in fundamental cell processes such as development, differentiation, proliferation, survival and death. Studies have identified miRNAs in plasma of cancer patients in a stable form. The study aims to evaluate the diagnostic and prognostic abilities of miR 135b as a biomarker for colorectal cancer.

**Methods/Interventions:** 44 patients with Colorectal Cancer were selected from our institution's colorectal cancer surveillance programme. All selected patients at follow-up had no evidence of tumour recurrence on clinical, radiological and endoscopic assessment. Blood samples were obtained pre-treatment and at a median follow-up of 36 months. A total of 32 pairs of blood samples were matched pre and post treatment. Plasma RNA was extracted and target miRNAs were identified on pooled case miRNA assay cards. The miRNA fraction was quantified by quantitative RT-PCR assay. The results of pre and post-treatment samples were analysed using Microsoft excel 2010 & SPSS Software v22.0. Relative expression (DCT) for each miRNA was created by normalizing the expression levels (CT) with that of RNU6B. DCT miR135b pre-treatment = miR135b Pre-treatment - U6 Pre-treatment DCT miR135b post-treatment = miR135b Post Treatment - U6 Post-treatment DDCT miR 135b = DCT miR135b pre-treatment - DCT miR135b post-treatment All the analysis was performed on SPSS Software v22.0 (IBM, New York, USA).

**Results/Outcome(s):** Paired T-Test of matched samples showed significant difference between Pre-Treatment (M=28.7985, SD = 5.19380) and Post -Treatment (M=32.3695, SD = 6.27462);  $t = -2.498, p=0.018$ . The Levels were high before the treatment and lower after the treatment. **Mann-Whitney** test U test and **Kruskall-Wallis** test were done to evaluate the relationship between

miR-135b Pre- Rx, miR 135b Post Rx, miR-135b Pre-Post Rx, DCT 135b Pre- Rx, DCT Post 135b - Rx and DDCT Pre-Post 13b against the TNM, Dukes staging, CEA levels, Differentiation, Site of tumour, Sex, Median Age, Metastasis, Treatment and Margin resection. The results were not significant except for node staging and Age (Image 1).

**Conclusions/Discussion:** The Mean 135B Levels have decreased from Pre-Treatment to Post-Treatment levels signifying that Mir135B is not only a Diagnostic But also a Prognostic Marker. After normalising with U6, The pre-treatment samples showed high levels with CRC patients with no nodes and patients with more than 4 nodes positive. But, low with CRC Patients with up to 3 nodes. Post treatment samples after normalising with U6 showed The Age (<72.5) show low levels after the treatment and high levels for the age (>72.5).

**Table 1:** Statistical tests of miR135b expression levels with variables lymph node status and Age.

Test	Variables	Mir 135 Pre- Rx	Mir 135b Post- Rx	Mir 135b Pre-Post Rx	DCT 135b Pre- Rx	DCT Post 135b - Rx	DDCT Pre-Post 13b
Kruskall- Wallis	N0- No nodes N1- Up to 3 Nodes N2- 4 or More Nodes	p=0.124	p=0.891	p=0.795	p=0.016	p=0.667	p=0.044
Mann Whitney	Median Age < 72.5=1 Median Age > 72.5=2	p=0.270	p=0.596	p=0.051	p=0.119	p=0.039	p=0.128

**CREATIVE APPROACH TO LAPAROSCOPIC TRANSVERSE COLON CANCER SURGERY FOR OVERCOMING TECHNICAL DIFFICULTIES.**

P166

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**Purpose/Background:** Transverse colon cancer surgery is one of the most difficult laparoscopic procedures, due to anatomic hazards, such as anatomic variations in mesenteric vessels, complex structure of the organs and the surrounding membranes. Moreover, laparoscopic transverse colon surgery (Lap-T) is unique, with a unidirectional field of view.

**Methods/Interventions:** To overcome the difficulties of Lap-T, we utilize Virtual Surgical Anatomy (VSA) using 3D-CT to manage variations in mesenteric vessel anatomy. All operations for transverse colon cancer are simulated using VSA, prior to surgery. This is especially useful in approaching the gastro-colic trunk (GCT) and middle colic artery (MCA). 3D laparoscopy equipment

**P164 Association with Ascitic CEA and Elastic Lamina Defect**

	Ascitic CEA (-)	Ascitic CEA (+)	Total
Elastic lamina defect (-)	56 (70.0%)	24 (30.0%)	80 (100%)
Elastic lamina defect (+)	8 (36.4%)	14 (63.6%)	22 (100%)
Total	64 (62.7%)	38 (37.3%)	102 (100%)

p=0.004



including camera, monitor and glasses was introduced in 2015, which has contributed to a dramatic improvement in the technique of Lap-T. In surgical procedure, we generally perform a complete mesocolic excision (CME) of the transverse colon. Since the border of the CME is difficult to identify, we set a virtual linear border for the CME, which lies from the head of the pancreas to the ligament of Treitz. When approaching the pancreatic tail, it is easier to recognize the boundaries of the mesocolon, if gauze is placed by retroperitoneal dissection. We approach the GCT and MCA from four directions (right and left, up and down), not only one direction. This multi-directional approach contributes to improved spatial perception of the organs.

**Results/Outcome(s):** We have performed 51 cases of Lap-T to date, while constantly making small modifications in technique. We have no cases of laparotomy conversion. All of the cases have been done safely, with minor complications, including 2 cases of anastomotic stenosis, 2 of phlegmone, 1 of pneumonia, and 1 of pulmonary edema. All the cases were treated conservatively. Postoperative hospital stay was 9 days (7-21), and there were no patients with re-hospitalization.

**Conclusions/Discussion:** Strategies to overcome technical hazards associated with Lap-T include, preoperative surgical simulation using VSA, 3D laparoscopic surgery using 3D equipment, identifying the border for the CME, and four-direction approach to the mesentery.

#### NON OPERATIVE MANAGEMENT OF RECTAL CANCER AT UNIVERSITY OF VERMONT MEDICAL CENTER: EXPERIENCE WITH CURATIVE AND PALLIATIVE INDICATIONS.

P167

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**Purpose/Background:** The standard definitive management of rectal cancer is surgical resection with or without stoma formation. A new approach using non-operative management (NOM) for select rectal cancers with chemoradiation therapy (CRT) and watchful waiting has been proposed as an alternative treatment strategy with fewer complications. This is a preliminary study of the watch-and-wait-approach for select rectal cancer at University of Vermont Medical Center, with both curative and palliative intent. We evaluated the rates of complete clinical response (cCR), disease free survival (DFS), and overall survival (OS) individuals undergoing NOM with curative intent. For patients undergoing primary CRT for stage IV rectal cancer, effectiveness of palliation was evaluated.

**Methods/Interventions:** M1 This is a retrospective chart review of patients who received CRT as definitive therapy for early rectal cancer. These patients elected NOM fearing risks of surgery and subsequent colostomy. Patients were either diagnosed or treated at University of Vermont

Medical Center between 2007 and 2016. Patients who received primary surgical therapy, including APR, LAR and TEM were excluded. Patients enrolled in a multicenter trial evaluating NOM of rectal cancer (OPRA Trial) were also excluded. The primary outcome measured was cCR. M2 The second study included a retrospective analysis of incurable stage IV rectal cancer patients who received CRT for palliation of symptoms related to the primary lesion. Endpoints included successful palliation of symptoms and avoidance of surgery related to the primary rectal tumor.

**Results/Outcome(s):** R1 Chart review of over 800 rectal cancer patients revealed 10 patients who met the inclusion criteria for our study. cCR was observed in 60% of the patients, and 40% had partial clinical response requiring salvage chemotherapy. Local recurrence developed in 2/10 pts (20%), and systemic recurrence occurred in 2/10 (20%). R2 Ten stage IV rectal cancer patients received CRT for palliation of symptoms from the primary tumor. Three of 10 patients (30%) underwent surgery due to failure of CRT to relieve symptoms. Seven of 10 (70%) patients who received CRT reported significant symptom resolution and avoided surgery.

**Conclusions/Discussion:** C1 Watch-and-wait therapy can provide cCR in a significant percentage of patients with little or no side effects, avoid a permanent stoma, and preserve quality of life. It is associated with low rates of local recurrence and development of metastatic disease. C2 CRT can provide effective palliation and avoid surgery in the majority of patients with metastatic cancer, who present with a symptomatic primary rectal lesion.

#### ANAL CANCER SCREENING KNOWLEDGE, ATTITUDES, AND PRACTICES AMONG HEALTHCARE PROVIDERS.

P168

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**Purpose/Background:** Anal cancer prevalence is increasing, especially among HIV+ and other immunocompromised patients. Although there are no formally established anal cancer screening guidelines, evidence suggests that providers are screening high-risk patients. The purpose of this study was to assess the knowledge, attitudes, and practices of anal cancer screening among providers to identify the degree of variation and barriers to screening.

**Methods/Interventions:** Providers at an academic medical center's high-volume HIV primary care clinic were surveyed using a web-based anal cancer screening questionnaire of multiple choice and Likert-type scale questions adapted from the *National Survey of Primary Care Physicians' Recommendations and Practice for Colorectal Cancer Screening* (National Cancer Institute). Descriptive

statistics were performed to assess provider responses, with Fisher's exact test used as appropriate.

**Results/Outcome(s):** 29 providers (response rate 91%) responded to the questionnaire: 76% physicians, 10% nurse practitioners, and 14% physician's assistants. Although 83% of providers perform anal cancer screening in their practice, 7% correctly identified all seven characteristics of high-risk patients (i.e. HIV+ patient, organ transplant recipient, men who have sex with men, female patient with abnormal cervical exam, history of anal condyloma, history of vulvar condyloma/dysplasia, HPV+ alone). "HIV+ patient" was identified most frequently as high-risk (93%), whereas "organ transplant recipient" was identified least frequently (31%). 55% of respondents identified high-resolution anoscopy (HRA) as a "very effective" method in reducing anal cancer mortality, compared to 14% of respondents for anal pap test. Anal pap test was the most recommended screening test (90%) compared to digital anorectal exam (DARE), HPV test, and HRA. 81% of providers performed anal pap test as first-line screening, and 76% referred patients for HRA if they tested positive. Factors most influential in guiding providers' screening recommendations were clinical evidence (69%) and national guidelines (55%). Barriers to screening "usually" pertained to lack of qualified providers who perform screening (38%), lack of follow-up by patients for positive test results (31%), and patient non-compliance for initial screening (17%).

**Conclusions/Discussion:** Anal cancer screening attitudes and practices vary among providers who screen high-risk patients. Although HIV was a commonly identified patient risk factor for anal cancer, providers did not recognize other immunocompromised patient factors. This raises concerns that some patient populations may be underscreened for anal cancer. Screening variation may be due to lack of national consensus guidelines for anal cancer screening. Development of national practice guidelines that define a multidisciplinary team approach from primary care anal cancer screening to specialist referral for HRA may reduce screening disparities.

## HIGH-RISK PEDUNCULATED POLYPS-SIZE DOES MATTER.

P169

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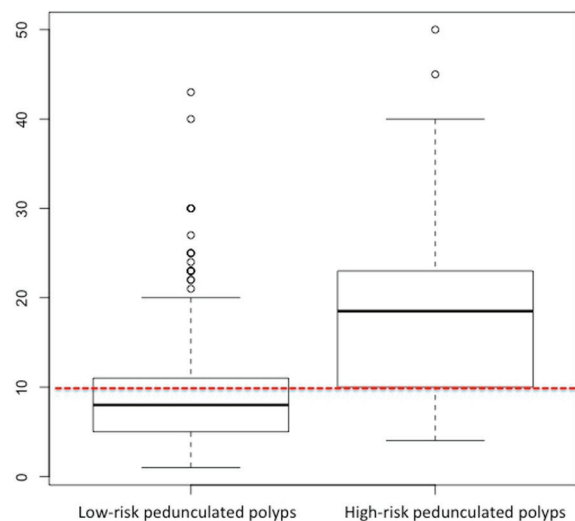
**Purpose/Background:** Very few studies address the risk of HGD and cancer in pedunculated polyps, since most studies do not differentiate between flat and pedunculated polyps. The aim of this study was to investigate the incidence and characteristics of cancer and high-grade-dysplasia in pedunculated polyps.

**Methods/Interventions:** This was a retrospective single center study of removed pedunculated polyps in the colon and rectum over a twelve months period. The data was

extracted from the departments' endoscopic database. Based on the conclusion of the pathologists' report, the polyps were defined as either high-risk pedunculated polyps (HRPP) including adenocarcinoma, HGD or sessile serrated lesion with dysplasia (SS), or low-risk pedunculated polyps (LRPP).

**Results/Outcome(s):** The evaluated material included 474 patients with a median age of 67 years and 288 patients (60.8%) were men. 85 patients (17.9%) had HRPP removed. 15 patients (3.2%) had adenocarcinoma, 65 patients (13.7%) had HGD and 5 patients (1%) had (SS). 389 patients (82.1%) had low-risk pedunculated polyps (LRPP) removed. In total, 660 pedunculated polyps were analysed. Of the 660 polyps removed, 92 (13.9%) were HRPP and 568 (86.1%) were LRPP. The HRPP were significantly larger than the LRPP,  $P < 0.0001$ , with a median size of 18.5 mm and 8 mm respectively. The HRPP were more likely than the LRPP to be removed with piecemeal resection than with en bloc polypectomy. Also, statistically significantly more HRPP did not have a free resection margin compared with the LRPP. 26.6% of LRPP were over 10 mm, but 73.4% of HRPP were over 10 mm. Among polyps  $\leq 10$  mm, 5.4% were HRPP compared with 31.1% of polyps over 10 mm,  $P < 0.0001$ . 16.4% of polyps over 10 mm did not have a free resection margin, which was significantly more than for polyps  $\leq 10$  mm,  $P = 0.02$ . Polyps over 10 mm were also more likely to be removed by piecemeal resection than en bloc,  $P = 0.0003$ .

**Conclusions/Discussion:** In this study, we demonstrate that 13.9% of pedunculated polyps were HRPP, and that 73.4% of HRPP were over 10 mm. Therefore in our opinion, all pedunculated polyps over 10 mm and polyps removed with piecemeal resection must be spotmarked when initially removed endoscopically, in order to relocate the site of polypectomy in cases with advanced histology and/or positive resection margin, prior to additional endoscopic therapy or surgical resection.



Box plot showing the difference in size in mm between low-risk and high-risk pedunculated polyps.

## MANAGEMENT REVIEW OF PAIN IN PELVIC EXENTERATION PATIENTS.

P170

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**Purpose/Background:** Pain is common in patients with locally advanced pelvic malignancies. This may be caused either by direct bony, nerve or muscle infiltration or be the result of referred pain. Pelvic exenteration (PE) is the only treatment that offers a chance at cure albeit at the risk of significant morbidity. Despite complete resection, PE patients remain at risk of persistent post-operative pain because of enbloc sacrectomy or pelvic nerve excision. Pain management has traditionally relied heavily on opioids which can be detrimental to long term pain management. The aim of this study was to document the prevalence of pain and to review the pain management so as to identify areas where this can be optimized.

**Methods/Interventions:** Consecutive patients undergoing PE between January 2013 and December 2014 were retrospectively reviewed. Baseline characteristics, operative details and post-operative complications were available through a prospectively maintained electronic database. This was supplemented with a medical chart review of patients' numerical rating scale (NRS) for their pain on days 1,2,3 and 7 post-operatively and analgesics used. Total opiate used was calculated through conversion to oral morphine equivalents (MEQ) using standard formulae. Associations were explored using X2 and t-tests.

**Results/Outcome(s):** There were 99 patients. Pre-operatively, 30 (30.3%) and 33 (33.3%) were on an opiate and neuropathic agent respectively with a median MEQ of 85mg (IQR 22.5-120mg). Forty-three (43.4%) and 42 (42.4%) underwent enbloc sacrectomy and pelvic nerve excision respectively. Approximately half, 1/3 and 1/5 patients had moderate or severe pain on days 1,3 and 7 post-operatively respectively. Pre-operative opiate use was associated with an involved margin (50% vs 29.4%,  $p=0.05$ ), longer length of stay in hospital (37.8 days vs 25.7 days,  $p=0.039$ ), worse post-operative pain (68.9% vs 43.9%,  $p=0.025$ ) and larger number of inpatient pain consults (9.3 vs 4.8,  $p<0.001$ ). However, sacrectomy and pelvic nerve excision were not predictive of worse pain post-operatively.

**Conclusions/Discussion:** Pain is a common problem amongst patients with locally advanced cancers of the pelvis. Pre-operative opiate use was associated worse pain outcomes post-operatively. There is heavy reliance on opiate pre-operative and throughout hospitalization. Improved pre-operative pain management using opiate sparing regimes may reduce long term pain morbidities in these patients.

## COMPARISON OF THE EFFECTS OF AQUEOUS EXTRACT OF SIDA CORDIFOLIA AND 5-FLUOROURACIL IN COLON CARCINOGENESIS INDUCED BY 1,2-DIMETHYLHYDRAZINE ON WISTAR RATS.

P171

F. Cruz, M. Jucá, D. Almeida, A. Santana, M. Moreira,  
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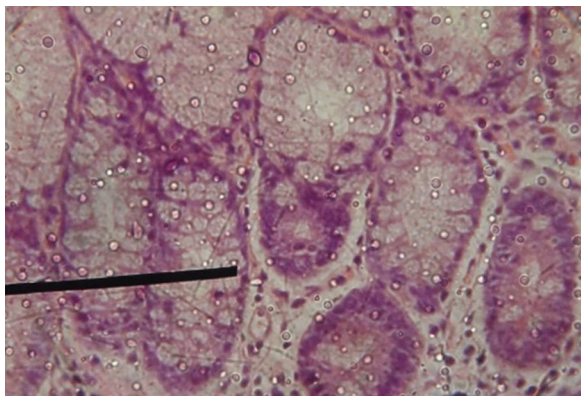
**Purpose/Background:** The search for new therapeutic agents and alternative strategies for chemoprevention of colorectal cancer is needed to reduce morbidity and mortality from this cause. This study aimed to compare the effect of aqueous extract of *Sida cordifolia* and 5-fluorouracil in colon carcinogenesis induced by 1,2-dimethylhydrazine (1,2-DMH).

**Methods/Interventions:** Fifteen 5 to 6 week old Wistar rats were tested, weighing between 200 to 240g. They were divided in three groups distributed in three boxes: GI (5 rats receiving no treatment, they were only administered 4 doses of 1,2-dimethylhydrazine, 2 doses per week); GII (5 rats treated with a standard antineoplastic drug, a weekly intraperitoneal administration of 50mg/kg of 5-fluorouracil); GIII (5 rats receiving 800mg/kg of the aqueous extract of *Sida cordifolia* lyophilized by gavage. The induction of aberrant crypt foci (ACF) in the colonic mucosa was achieved by administering 30mg/kg of 1,2-dimethylhydrazine via intraperitoneal twice a week for 2 weeks. The samples of colon were stored and the specimen was sent for anatomopathological analysis for identification and quantification of ACF.

**Results/Outcome(s):** The amount of aberrant crypt was greater in the distal segment of the rats' colonic mucosa in comparison to the proximal segment. The 69% reduction of crypt incidence in groups I and II ( $p=0,056$ ) suggests the well-known antiproliferative effect of fluorouracil as a drug used in chemotherapy treatment for colorectal cancer. The 25% reduction of crypt in the group treated with the extract wasn't associated to the significant variation of results in relation to the positive control group ( $p=0.26$ ). It can be observed a reduction of hepatic weight amongst the subjects of group III compared to groups I and II, with a significant difference between the animals that received the extract and those that received the 5-FU associated carcinogen ( $p=0,009$ ). This study showed a reduction of inflammatory activity in the colitis induced by the 1,2-dimethylhydrazine carcinogen administered intraperitoneally, given the noticeable decrease in inflammatory cell infiltration in the mucosa of the colon of subjects of group III in comparison to groups II and I, along with a thickening of the muscular layer also in the group that received the aqueous extract of *Sida cordifolia* by gavage.

**Conclusions/Discussion:** Aqueous extract didn't significantly reduce the number of aberrant crypt in the mucosa of the colon of rats with lesions induced by

administering 1,2-dimethylhydrazine when compared to the positive control group treated with 5-FU. On the other hand, results from the study have strengthened the evidence on hepatoprotection due to a significant decrease of hepatic weight compared to another experimental group, as well as its natural anti-inflammatory effect on the colitis induced by the carcinogen.



**A SYSTEMATIC REVIEW AND META-ANALYSIS OF THE OUTCOMES OF PATIENTS FOLLOWING SALVAGE TREATMENT FOR RECURRENT RECTAL CANCER MANAGED BY THE WATCH AND WAIT STRATEGY.**

P172

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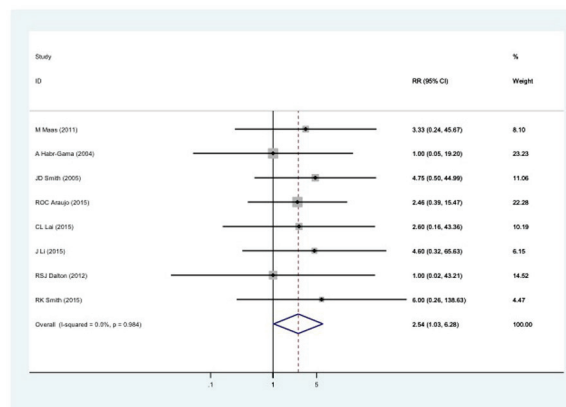
**Purpose/Background:** The current standard treatment for rectal cancer is surgical resection abiding by the principles of total mesorectal excision (TME), preceded by neo-adjuvant chemo-radiotherapy (CRT) if necessary. Despite the increasing use of minimally invasive approach in rectal cancer surgery surgical resection continues to be associated with significant morbidity. Therefore, over the recent years, there has been a gradual paradigm shift towards organ preservation in the treatment of rectal cancer in patients who had a complete clinical response following neoadjuvant CRT. As a result, the ‘watch and wait’ (W&W) approach emerged in the wake of several studies. However, less is understood about the outcomes of this cohort of patients who had complete response and also on those who are required to have subsequent salvage therapy (ST) following recurrence after initial complete response to CRT. In the absence of multicenter RCTs a systematic review could be a useful to guide future advances in rectal cancer management and research. This review aims to assess the outcomes between those who had salvage therapy versus conventional surgery.

**Methods/Interventions:** A comprehensive systematic search was performed using EMBASE, PubMed, MEDLINE, ScienceDirect and Journals@Ovid; published between 2004 and 2016. The MeSH terms “rectal cancer”,

“watch and wait”, “chemoradi\*”, “rectal carcinoma”, “rectal neoplasm”, “active surveillance” and “organ preservation” were used. References from relevant articles were also manually reviewed. All eligible articles were independent and contained the minimum information required to estimate risk ratios (RR). Quality of the studies were assessed using the Newcastle-Ottawa assessment scale. The main outcome was mortality and RRs for mortality were calculated. Pooled RR were estimated using fixed-effects model (STATA 13.0).

**Results/Outcome(s):** A total of 736 records were identified. 8 eligible studies were included in the meta-analysis. Out of 244 patients who followed the watch and wait strategy, 11.5% had salvage therapy due to recurrent disease (both local and distant). No heterogeneity was found in the results. The RR of ST was 2.54 (CI: 1.03-6.28), which showed an increased likelihood of mortality in the ST cohort compared to the standard care cohort. The overall effect showed statistical differences between the salvage therapy group versus conventional surgery group (p=0.044).

**Conclusions/Discussion:** Our analysis has shown a 2.54 increased risk in mortality for patients who had salvage treatment for recurrence following the watch and wait protocol compared to mortality risk in the standard treatment group. Our findings provide useful information for both patients and clinicians to refer to when considering treatment options in rectal cancer until outcomes of further studies become available on the outcome of the ‘watch and wait’ approach.



## MULTIPLEX MUTATIONAL ANALYSIS IN PATIENTS WITH NON-METASTATIC COLORECTAL CANCER: EXCESS, OPPORTUNITY, AND ADDED EXPENSE.

P173

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**Purpose/Background:** Current guidelines recommend KRAS, NRAS, and BRAF mutational analysis in patients with metastatic colorectal cancer. Multiplex mutational analysis (MMA) is a platform that may be used to evaluate these and other genes of interest. At our hospital, MMA with a 13-gene colorectal cancer-specific panel, is often performed in an “off-label” manner in patients with non-metastatic colorectal cancer. The aims of this study were to correlate MMA with standard pathology assessment, determine its impact on treatment and prognosis, and estimate cost.

**Methods/Interventions:** Retrospective analysis of stage I-III colorectal cancer patients who underwent surgery, from 2013 to 2016, at a university hospital. When MMA was performed, associations between mutation(s) present, standard pathology assessments, staging, treatment, and cancer recurrence were evaluated. MMA cost was estimated with the 2016 CMS clinical diagnostic laboratory fee schedule.

**Results/Outcome(s):** Among 128 patients with stage I-III colorectal cancer, 58 (45%) had MMA performed. Mean age was 61 ±12 years; 27 (47%) were male; 37 (64%) had colon cancer and 21 (36%) had rectal cancer. There were 8 (14%), 21 (36%), and 29 (50%) patients with stage I, II, and III cancer, respectively. The median number of mutations per patient was 3 (1-10). The frequency of each mutation were: TP53 (n=41, 71%), APC (n=35, 60%), KRAS (n=24, 41%), PIK3CA (n=14, 24%), FBXW7 (n=8, 14%), PTEN (n=7, 12%), NRAS (n=6, 11%), BRAF (n=6, 10%), MET (n=4, 7%), CTNNB1 (n=3, 5%), AKT1 (n=2, 4%), EGFR (0%), and SRC (0%). APC mutation was more common in rectal (n=17, 81%) than colon cancer (n=18, 49%; p=0.025). The presence of ≥3 mutations (n=33, 57% patients) was not associated with T, N, or TNM stage, microsatellite stability, mismatch repair protein expression, or degree of differentiation (all p>0.05). MMA results were documented by the oncologist in 27 (47%) of patients. Of 14 (24%) patients with a PIK3CA mutation, 3 (21%) were prescribed aspirin therapy. At median follow up of 9 (1-43) months, 18 (31%) patients had cancer recurrence. The only mutation associated with disease-free survival was APC (HR 0.35, 95% CI 0.13-0.96). KRAS, NRAS, and BRAF mutations were not associated with TNM stage or recurrence. Total MMA fees were \$34,226 (58 x \$592)

**Conclusions/Discussion:** Multiplex mutational analysis performed in an “off-label” manner in patients with stage

I-III colorectal cancer does not correlate with conventional pathology assessment or staging, infrequently results in adjuvant treatment changes, even when opportunity presents itself (PIK3CA-aspirin), and adds cost to care. MMA provides an excess of information that is generally non-actionable in stages I-III colorectal cancer. In these patients, analysis of the individual genes, PIK3CA and APC, appears to be of greater utility in terms of treatment and prognosis, should reduce cost, and may therefore be preferable to MMA.

## IMPACT OF WEEKEND DISCHARGE ON READMISSION RATE AFTER ELECTIVE COLECTOMY.

P174

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**Purpose/Background:** Hospital readmissions after colectomy are costly and potentially preventable. For elective colectomy patients, it is unknown whether discharge on a weekday versus weekend impacts readmission rate. The purpose of this study was to query a national database to determine whether discharge on a weekend is predictive of increased readmission risk following elective colectomy.

**Methods/Interventions:** After exemption status was granted by the institutional review board, the University HealthSystem Consortium (UHC) national database was queried to identify adult patients with diverticular disease, inflammatory bowel disease, malignancy or benign neoplasm who underwent elective colectomy from 2011 to 2015. The primary outcome was 30-day readmission risk. Secondary endpoints were reoperation, intensive care unit (ICU) stay, length of stay and death during readmission hospitalization. Univariate analyses, student's t-test and chi-square, were used to compare index hospitalization demographics and clinical characteristics, as well as readmissions for patients discharged on weekdays and weekends. Univariable and multivariable logistic regression models were used to estimate crude and adjusted odds ratio of hospital readmissions, respectively, based on weekend and weekday discharge. All statistical analyses were done using STATA version 14.1

**Results/Outcome(s):** Of the 76,031 patients who survived the index hospitalization, 22,913 (30%) were discharged on the weekend and 53,118 (70%) were discharged on weekdays. Overall, 30-day readmission rate was 10.5% (N=7,985); 2,190 (27%) were from the weekend discharges, and 5,795 (73%) were from the weekday discharges. Among the weekend discharges, the readmission rate was 9.6%, compared to 10.9% among the weekday discharges (p<0.001). In unadjusted analysis, the 30-day readmission risk was lower if the patient was discharged on a weekend compared to a weekday (OR

0.86, 95% CI 0.82-0.91); however, after adjusting for major confounders, the risk of readmission was similar for weekend and weekday discharges (OR 0.95, 95% CI 0.89-1.00). Independent predictors of readmission, regardless of day of discharge, included patients with higher severity of illness scores, those who had ileostomy or who were discharged to facilities. The readmission hospitalization was similar between the two groups with respect to length of stay, mortality and re-operation.

**Conclusions/Discussion:** Using a large national database, patients discharged on a weekend following elective colectomy were not at increased risk of readmission. This data suggests that concern for increased risk of readmission for patients discharged on weekends may be unfounded.

Characteristic	Cohort, %		P-value
	Weekend	Weekday	
Patients, No. (%)	22,913 (30%)	53,118 (70%)	
<b>Sex</b>			0.354
Male	49%	49%	
Female	51%	51%	
<b>Age</b>			<0.0001
Mean Age	57.8	58.5	
<b>Race</b>			<0.001
White	79%	78%	
Black	10%	11%	
Other	11%	11%	
<b>Insurance type</b>			<0.001
Private	53%	50%	
Medicare/Medicaid	42%	45%	
<b>Ostomy</b>			0.015
Ileostomy	4%	5%	
<b>PrimaryDx</b>			<0.001
Benign Neoplasm	16%	15%	
Diverticular	25%	24%	
Inflammatory Bowel	17%	18%	
Malignant	41%	43%	
<b>Severity of Illness Score</b>			<0.001
1	44%	40%	
2	36%	36%	
3	8%	9%	
4	0.3%	0.4%	
<b>ICU stay</b>			<0.001
Yes	8%	11%	
<b>Drain (IR)</b>			<0.001
Yes	1%	2.12%	
<b>Disposition</b>			<0.001
Home	80%	74%	
Home with services	16%	20%	
SNF	2%	5%	
Rehab	0.4%	1%	
LTCH	0.2%	0.4%	

**POSTOPERATIVE CHEMORADIOTHERAPY AFTER LOCAL RESECTION FOR HIGH-RISK T1-T2 LOW RECTAL CANCER: RESULTS OF SINGLE-ARM, MULTI-INSTITUTIONAL, PHASE II CLINICAL TRIAL.**

P175

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 Kashiwa-City, Japan; chuou-Ku, Japan; Higashinari-Ku, Japan; Chuou-Ku, Japan; Matsuyama, Japan

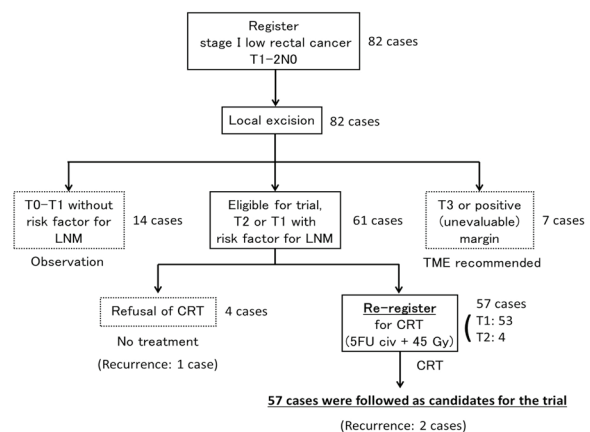
**Purpose/Background:** Local recurrences were reported to develop after local excision (LE) for low to mid-rectal cancer in 0%-20% of patients with T1 lesions and 0%-37% of patients with T2 lesions. We designed Japanese, multi-institute, a prospective, single-arm, phase II trial to determine the efficacy and the safety of chemoradiotherapy combined with local excision in the treatment of early-stage lower rectal cancer (T1, T2).

**Methods/Interventions:** The study was registered as a clinical trial in the Japanese University Hospital Medical Information Network (UMIN, registration number

000011417). From April 2003 to October 2010, a total of 82 patients were registered for the study, and transanal full-thickness LE of the tumor area was performed. Patients who had pT3, margin-positive, margin-unevaluable tumors were ineligible for the study, and were recommended to undergo radical surgery by TME. Similarly, patients with intramucosal carcinoma or carcinoma with slight submucosal invasion (<1000 μm) without any lymphovascular invasion were also excluded from the study. Finally, 57 patients were re-registered and treated by additional external beam irradiation (45 Gy) plus continuous 5-week intravenous injection of 5-fluorouracil (250 mg/m<sup>2</sup>/day). Fifty-three patients had clinical T1N0 lesions and 4 had T2N0 lesions in the low rectum, located below the peritoneal reflection.

**Results/Outcome(s):** With a median follow-up of 7.3 years after local excision, the 5-year disease-free survival rate was 94% (95% confidence interval: 84%-98%) for the total cohort of 57 patients, 96% (95% confidence interval: 85%-99%) for the 53 patients with T1 lesions, and 75% (95% confidence interval: 24%-97%) for the 4 patients with T2 lesions. There were 2 local recurrences during the entire observation period. One of these patients who had T1 lesion died of distant metastasis of rectal cancer, which occurred after radical salvage surgery (survival time after LE: 90 months). The completion rate for full-dose chemoradiotherapy was 86% (49/57). Serious treatment-related complications were not reported, except for 3 events caused by chemoradiation therapy. All 3 events were grade 3 according to the National Cancer Institute Common Toxicity Criteria, version 2.0.

**Conclusions/Discussion:** Fifty-five of the 57 patients in our study successfully avoided radical resections, such as APR and ISR, as well as very low anterior resection. The findings that the oncological outcomes of the study therapy were equivalent to those of radical resection for T1 lesions appears to be sufficient evidence to justify a change in the standard treatment for T1 low rectal cancers with risk factors for LNM. The addition of chemoradiotherapy to local excision for T1 rectal lesions could compensate for the less favorable oncological outcomes that are offered by LE alone.



## COMPARISON OF LOCAL CONTROL FOLLOWING SPHINCTER-PRESERVING PROCEDURES VERSUS ABDOMINOPERINEAL RESECTION FOR LOCALLY ADVANCED LOW RECTAL CANCER: A PROPENSITY SCORE MATCHED-ANALYSIS.

P176

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**Purpose/Background:** Sphincter-preserving procedures (SPPs) have become a widely used treatment for rectal cancer patients. The oncological safety of the procedures for locally advanced, lower lesion, however, is still debatable. This study aimed to assess the oncological safety of SPPs compared with abdominoperineal resection (APR).

**Methods/Interventions:** From 2010 to 2011, 1,500 consecutive stage II to III rectal cancer patients underwent radical resection at Japanese 69 institutions, and 794 patients with 2 to 5 cm from anal verge and clinical T3-4 tumor were eligible to this study. Cumulative incidence of local recurrence was primarily assessed. Propensity score matching method was performed to minimize the confounding effect due to the differences on the patient baseline characteristics associated with the choice of SPPs or APR and outcomes.

**Results/Outcome(s):** Before the matching, the candidates for APR were more likely to have lower and advanced lesion, while SPPs were more often performed following preoperative treatment and at institutions with higher case volume. After the matching, 398 patients (199 each for SPPs and APR) were included into the analysis sample, and better balance on the patient background variables was observed. The SPPs group included 88 patients undergoing intersphincteric resection (44%) and 110 patients undergoing low anterior resection (56%), and diverting stoma was fashioned in 163 patients (82%). One third of the patients were operated by laparoscopic surgery (34% vs. 33%), and about half of the patients underwent simultaneous lateral pelvic lymph node dissection (55% vs. 53%) in each group. The SPPs group had lower intraoperative blood loss (335 ml vs. 444 ml,  $p=0.02$ ) and blood transfusion rate (15% vs. 24%,  $p=0.02$ ). Postoperative morbidity was similar between the SPPs and APR groups (38% vs. 39%,  $p=1.00$ ). The length of hospital stay was shorter in the SPPs group (19 days vs. 22 days,  $p<0.01$ ). Margin involvement was occurred in 8 patients of the SPPs group (1 of distal margin and 7 of circumferential margin) and 12 patients of the APR group (4% vs. 6%,  $p=0.49$ ). No difference in 3-year local recurrence rate was noted between the SPPs and APR groups (11% vs. 14%,  $p=0.40$ ; hazard ratio 0.77, 95%CI 0.42-1.41). The proportion of salvage surgery for local recurrence was likely to be higher

in the SPPs group although there was no significant difference (35% and 13%,  $p=0.15$ ).

**Conclusions/Discussion:** This observational study ensuring the comparability by adjusting the confounding factors suggested that SPPs and APR were equivalent in oncological local control, and that SPPs had some advantages in postoperative outcomes over APR. These findings could better support preoperative decision and patient counseling

## PRESERVATION OF PATHOLOGIC OUTCOMES IN ROBOTIC VERSUS OPEN TOTAL MESORECTAL EXCISION: CAN THE ROBOT FILL THE MINIMALLY INVASIVE GAP IN RECTAL CANCER?

P177

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**Purpose/Background:** Open total mesorectal excision (TME) remains the standard of care in the surgical management of rectal cancer with recent studies unable to prove non-inferiority of laparoscopic TME. Benefits of robotic TME are unclear and few studies directly compare robotic versus open TME. The surgical integrity of the resected specimen is the most important prognostic factor in rectal cancer recurrence. The aim of this study was to compare the surgical integrity of robotic TME to open TME at our institution.

**Methods/Interventions:** Charts of consecutive patients undergoing robotic or open TME for rectal cancer during a 3-year period beginning with the first robotic TME performed at our institution in October 2013 were reviewed. The primary endpoint was successful surgical resection, defined pathologically using a composite of complete TME, circumferential resection margin (CRM)  $<1\text{mm}$ , and distal resection margin (DRM)  $<1\text{mm}$ . Predictors of unsuccessful surgical resection were investigated. Short-term perioperative endpoints were also assessed. Values are reported as a median (range) or percent and analyzed using Mann-Whitney or Fisher's exact tests.

**Results/Outcome(s):** The study cohort included 64 patients undergoing robotic ( $n=28$ ) or open ( $n=36$ ) TME. Median age was 65 (32 – 88) years and 38 (59%) were male. 20 (71%) patients in the robotic and 24 (67%) in the open TME group received neoadjuvant chemoradiation. Tumors were located  $\leq 5$  cm from the anal verge in 11 (39%) patients undergoing robotic and 11 (31%) patients undergoing open TME. The primary study endpoint, successful surgical resection, was similar between robotic (75%) and open (75%) approaches. TME was complete in 21 (75%) robotic and 27 (75%) open cases ( $p=0.80$ ). CRM was  $>1\text{mm}$  in all robotic TME and 34 (94%) open TME ( $p=0.5$ ). DRM was  $>1\text{mm}$  in all robotic and open TME. In regards to secondary endpoints, robotic TME was

associated with significantly lower blood loss ( $p=0.02$ ) but significantly longer operative times ( $p=0.009$ ) compared to open TME. Length of hospital stay and complications were similar between surgical groups. Tumor distance from the anal verge was a predictor for unsuccessful [3.5 (2–18) cm] vs. successful [10 (1–12) cm] surgical resection in open TME ( $p=0.015$ ) but not in robotic surgery [5 (2–14) cm vs. 8 (1–15) cm;  $p=0.44$ ].

**Conclusions/Discussion:** Pathologic outcomes of robotic TME are similar to open TME for rectal cancer, even in the early learning curve and adoption of this new technique. While tumor distance from the anal verge complicates successful surgical resection in open TME, robotic surgery is less impacted. Recent studies advocate against the use of laparoscopic proctectomy for low rectal cancer. Robotic TME may be a promising substitute for a minimally invasive approach to rectal cancer.

#### PERSONALITY AND DECISION-MAKING STYLE, AND THEIR RELATIONSHIP WITH DISTRESS IN PATIENTS UNDERGOING PELVIC EXENTERATION.

P178

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**Purpose/Background:** Pelvic exenteration is the only curative option available to patients with locally advanced cancers of the pelvis, whether it is an advanced primary or recurrent disease. Pelvic exenteration is a complex and morbid procedure that can be associated with considerable short and long term complications including long term functional sequelae that can affect the patient's recovery, contribute to psychological distress and therefore longer term quality of life. At an individual level, personality traits and decision making styles are usually stable throughout life and it is hypothesized that patient personality and decision making styles which influences coping strategies may also affect post-operative recovery in terms of distress experienced and quality of life.

**Methods/Interventions:** A cross sectional study of patients previously prospectively enrolled in a longitudinal quality of life study after pelvic exenteration at a single quaternary referral centre was undertaken. Patients were asked to complete two validated questionnaires, the Big Five Inventory (BFI) and the Melbourne Decision Making Questionnaire (MDMQ) for personality traits and decision making styles respectively. Both questionnaires were scored using the prescribed methods and were correlated with patient distress measured pre-operatively and at 6 and 12 months post-surgery using the distress thermometer.

**Results/Outcome(s):** Forty-three patients responded to the questionnaire (46% response rate). There were 26 male (61%) patients. The indications for pelvic exenteration were for an advanced primary in 28 (65%) and a

pelvic recurrence in 14 (33%) patients. The distribution of the 5 traits (openness, extroversion, conscientiousness, neuroticism and agreeableness) was fairly consistent with that of the general population with most patients being conscientious, agreeable and open. Neuroticism is moderately associated with post-operative distress at 6 and 12 months ( $p=0.017$ ,  $p=0.040$ ). Decision making styles were "vigilant" (mean score 10, std dev 2.2, possible range 0–12) in their decision making style followed by "buck-passing" (mean score 3.8, std dev 2.8, possible range 0–12), "hypervigilance" (mean score 3.2, std dev 2.5, possible range 0–10) and "procrastination" (mean score 2.4, std dev 2.0, possible range 0–10). Hypervigilance has a weak to moderate correlation with worse distress pre-operatively as well as 6 and 12 months post-operatively ( $p=0.052$ ,  $p=0.049$ ,  $p=0.027$  respectively).

**Conclusions/Discussion:** Patient personality and decision styles may affect post-operative distress experienced. This warrants further exploration in larger studies. The findings of this study also has implications in that patients at risk of post-operative distress may be identified pre-operatively and targeted for additional support pre and post-operatively so as to facilitate their recovery.

#### TRANSANAL ENDOSCOPIC MICROSURGERY AFTER NEOADJUVANT RADIOCHEMOTHERAPY FOR LOCALLY ADVANCED EXTRAPERITONEAL RECTAL CANCER.

P179

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**Purpose/Background:** The introduction of preoperative radio-chemotherapy (RCT) in locally advanced rectal cancer (LARC) can lead to a pathologic complete response (pCR) in a percentage varying from 8 to 30%. pCR is associated with very good results in terms of local control (LC), disease-free survival (DFS) and overall survival (OS) and radical surgery is probably useless in this group of patients. In our institution, we used local excision by transanal endoscopic microsurgery (TEM) to confirm pCR after a major/complete clinical response to neo-adjuvant RCT. Aim of this study is a prospective analysis of post-operative complication rate, functional results at 1 year and oncological outcome in this group of patients.

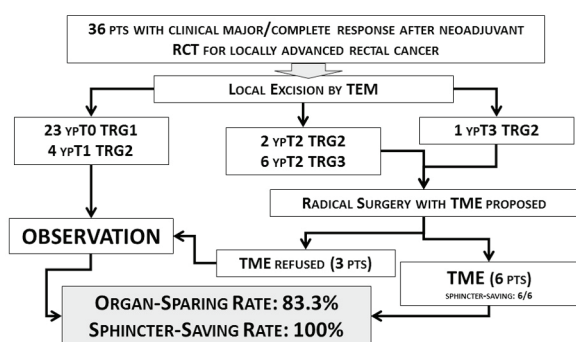
**Methods/Interventions:** All patients with LARC treated by pre-operative RCT and local excision by TEM between 2000 and 2014 were included. Major/complete clinical response was defined as: no mucosal abnormality or a residual scar or a superficial ulcer less than 1 cm at digital examination and at endoscopy and negative pelvic MRI. If pathological analysis of the rectal wall disk confirmed near complete or pCR ( $ypT \leq 1$  and TRG1–2), an intensive follow



up was proposed. If pathological response was incomplete (ypT>1 and/or TRG>2) a radical resection with total mesorectal excision (TME) was proposed. Early (within 30 days) p.o. morbidity (according to Clavien's classification) and mortality, long-term oncological outcome and functional outcome at 1 year from TEM (evaluated by a questionnaire on evacuation and continence disorders proposed by Gervaz and Wexner) were analyzed.

**Results/Outcome(s):** 36 patients (median age 63 years) entered the study. Median p.o. hospital stay was 5 days. No early p.o. mortality occurred. In 15 patients (41.7%) a post-operative complication occurred: 9 grade I, 6 grade II and 0 grade 3. At pathological analysis 23 specimens were pT0 TRG1 and 4 pT1 TRG2. In 9 cases with pT>1 and/or TRG>2 TME was proposed: 3 refused it, whereas 6 patients underwent to TME (Fig. 1). The correspondence between clinical and pathological response was 75%. Median follow-up was 68 months. 1 local recurrence and 4 distant metastases occurred. The 5-yr actuarial LC, OS and DFS were respectively 96.0%, 92.0% and 82.8%. At 1 year from TEM functional outcome was analyzed in 30 patients. The median evacuation score was 24. The most frequent symptoms were urgency (10%) and incomplete emptying sensation (10%). The median continence score was 2 and the most frequent symptom was incontinence to flatus (13.3%).

**Conclusions/Discussion:** In case of major or complete clinical response of LARC after pre-operative RCT, full thickness local excision by TEM can be used to confirm the pathological response, avoiding the necessity of radical surgery and preserving the anatomical and functional integrity of the rectum. In our experience, this approach seems to guarantee oncological safety with the functional advantages of an organ-sparing procedure.



## RESULTS OF THE INAUGURAL ASCRS TRANSANAL TOTAL MESORECTAL EXCISION CADAVER COURSE.

P180

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**Purpose/Background:** TaTME is a rapidly evolving approach for low and mid-rectal cancers fusing expertise in minimally invasive surgery (MIS) TME and transanal endoscopic surgery (TES). Procedural training in fresh cadavers is thought to be an essential prerequisite to clinical adoption. The impact of the first ASCRS taTME workshop held at the 2016 Annual Meeting is appraised.

**Methods/Interventions:** Eligible teams included 2 staff surgeons intending to adopt or refine clinical taTME at their respective institutions. Following video-based didactics, taTME was performed in fresh male cadavers with a 1:1 proctor:trainee ratio. Defined procedural steps were scored for competency by trainees and proctors according to a Global Assessment Survey (GAS) that was agreed upon at a recent taTME consensus conference and adapted for cadaver lab training. Fresh TME specimens were rated by trainees and their proctors. Post-course surveys were sent to trainees 4 months later.

**Results/Outcome(s):** Teams averaged 8.5 (range 1-18) years in practice performing an average 26 (7-51) MIS TME and 16 (2-75) TES per year. Pre-course, 9/16 trainees performed 1-7 clinical taTME cases. In-course, taTME was completed by 7 teams and aborted by one due to rectal perforation. Mean time to complete transanal dissection was 116.5 (80-161) minutes. GAS scores are depicted on Table 1. The steps reported to have been performed with the highest level of competency (GAS>4) by both trainees and proctors were transanal platform setup, rendezvous, and transanal extraction. Steps of lowest competency were securing the pursestring, correct lateral plane dissection, and stepwise circumferential TME. TME specimens were graded as complete/near complete by 6/7 teams of trainees compared to 4/7 of their respective proctors. Within 4 months, post-course, 12/16 (75%) trainees performed a total of 39 (1-11) taTME cases. Indications included rectal cancer (38) and IBD (1). Among the 7 surgeons without prior taTME experience, 5 (71%) transitioned to clinical taTME. All 12 respondents performed taTME with their ASCRS course partner. 5 surgeons (6/39 cases) were proctored. 92.3% of TME specimens were complete/near complete. Intraoperative and postoperative complication rates were 47% and 57% respectively. 63% of trainees expressed interest in being proctored. All 4 surgeons who have not performed taTME since the course expect to do so within 6-12 months.

**Conclusions/Discussion:** The proposed taTME training pathway that includes structured didactics followed by

hands-on training in fresh cadavers was adopted at the ASCRS inaugural taTME workshop and applied to a cohort of high-volume rectal cancer surgeons with experience in MIS and TES. In combination with GAS scoring of procedural steps by trainees and proctors and TME grading, this training pathway resulted in 75% of trainees practicing taTME within 4 months. Hands-on cadaver labs combined with proctorship is likely to ensure safe implementation of taTME.

Global assessment score	TME PROCEDURAL STEPS											
	SET UP			TME DISSECTION					ANASTOMOSES			
Transanal platform setup	Specimen preserving	Correct level of proctectomy	Correct dissection of posterior plane	Correct dissection of anterior plane	Correct dissection of lateral plane	Dissection in stages (circumferential resection)	Connection to abdominal and transverse (mesenteric)	Extraction of specimen without rupture	Handsewn anastomosis	Stapled anastomosis	Stapler placement through preserving and loss of stapler	
Not performed	1	2	1	1	1	1	1	1	1	1	1	1
Performed with proficiency	2	2	2	2	2	2	2	2	2	2	2	2
Performed with moderate proficiency	3	3	3	3	3	3	3	3	3	3	3	3
Performed with minimal proficiency	4	4	4	4	4	4	4	4	4	4	4	4
Completed performance	5	5	5	5	5	5	5	5	5	5	5	5
Proficient performance	6	6	6	6	6	6	6	6	6	6	6	6
Average Trainee self-Assessment score	4.3	3.9	4.5	4.4	4.5	4	4.4	5.3		4.8	4.8	
Average Proctor	4.7	3.7	4.6	3.7	3.9	3.7	3.8	4.1	4.8	4.1	3.5	3.5

**Global Assessment Survey (GAS) Results as Recorded by Trainee and Proctor.** Values highlighted in blue indicate surgical steps rated by both trainee and proctor as being performed with the highest level of competency (GAS>4). Values highlighted in red indicate surgical steps rated with lowest competency (GAS≤4).

### DELAY BETWEEN NEOADJUVANT CHEMORADIATION AND SURGERY ON RECTAL CANCER OUTCOMES.

P181

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**Purpose/Background:** Neoadjuvant chemoradiation therapy (CRT) followed by total mesorectal excision (TME) is considered standard of care for locally invasive rectal cancer. Delay after CRT is required for adequate tumor regression and resolution of radiation effects. In Canada, long-course neoadjuvant chemoradiation has been widely adopted for locally invasive rectal cancer, with a typical delay to surgery of 6-8 weeks. There has been debate in the literature regarding interval length on pathological clinical response (pCR), surgical outcomes and survival. This aim of this study is to determine if longer delays impact short and long term rectal cancer outcomes.

**Methods/Interventions:** The prospectively maintained St Paul's Hospital Colorectal Cancer Database in Vancouver, Canada was queried to identify patients undergoing neoadjuvant long-course CRT and elective surgery with curative intent at St. Paul's Hospital. Patients with metastatic disease at presentation were excluded. The two cohorts were defined as patients having surgery at less than 8 weeks after completion of neoadjuvant CRT or greater than 8 weeks. Primary outcome was a composite of negative distal margin (>1mm), clear circumferential radial margin (>1mm) and TME quality. Secondary outcomes included pathological clinical response (pCR), disease-free survival, perioperative complications according to Clavien-Dindo (CD) classification and anastomotic leaks requiring intervention. Demographic data was analyzed

using two-tailed T tests and Univariate Chi square analysis. Clinical outcomes were assessed with multivariate logistic regression (adjusted for age, gender, BMI, ASA, cT/N stage, distance from anal verge, and operative procedure). The composite outcome was analyzed using Fisher's Exact test, and disease-free survival by proportional hazard model and Kaplan-Meier regression.

**Results/Outcome(s):** A total of 271 patients were treated with curative resection following long-course CRT between 2006 and 2016. 49% were in the long-interval group (n=133). There was no significant difference between shorter and longer delays for patient demographics, tumor and nodal staging, distance from anal verge (p>0.10), and restorative procedures. Response to CRT measured by pCR was comparable. There was no significant difference between groups for the composite outcome measure, complete TME or total number of perioperative complications. However, the rate of anastomotic leaks requiring intervention was significantly increased for the shorter delay group (5% vs 15%, p=0.01). Disease-free survival was comparable.

**Conclusions/Discussion:** Shorter delays between completion of CRT and surgery is associated with increased anastomotic leaks in locally invasive rectal cancer, potentially due to poor resolution of the acute inflammation following CRT. There were otherwise no differences in outcomes. This study adds insight into our understanding of timing between neoadjuvant therapy and surgery outcomes in rectal cancer.

Table 1. Comparison of outcomes between interval groups

Surgical Outcomes	Interval ≤ 8 weeks (n = 138)	Interval >8 weeks (n = 133)	Difference (95% CI)
Clavien-Dindo			
1-2	56	48	
3-4	20	18	0.56*
Anastomotic Leak			
A	21	7	
B	1	1	
C	19	6	0.01†
Tumour Outcomes			
pCR	28	24	0.55
Composite Outcome			
cRM>1mm, DM(-), TME complete	121	116	0.56

\*CD classification ≥3; †Anastomotic Leaks requiring intervention ≥B

### VIRTUAL MULTIDISCIPLINARY CASE CONFERENCES: A SYSTEMATIC REVIEW.

P182

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**Purpose/Background:** Multidisciplinary case conferences (MCC) play an integral role in the management rectal cancer patients. A traditional MCC involves face to face meetings held at regularly scheduled times but barriers to participation include time commitment and constraints, the need for geographic co-location, or availability of expensive

tele- or video-conferencing equipment. Virtual MCC's (vMCCs) offer a potential solution to these issues. The difference between a traditional (synchronous) MCC and a truly virtual MCC is that team members interact with one another in a non-simultaneous (asynchronous) way using shared clinical data, often supported by a web-based platform. A broader definition of vMCC includes real-time discussion using a web-based interface. The primary objective of this systematic review is to summarize the available literature on the existence, feasibility, and effectiveness of such frameworks in the context of cancer patient management.

**Methods/Interventions:** In July 2016, the electronic databases of Embase, Ovid Medline, Cochrane Library, and CINAHL were searched. Studies describing the use of a web-based platform to conduct MCCs, either in a synchronous or asynchronous fashion, were included. The primary endpoint was defined as the presence or absence of literature on the subject of vMCC with secondary endpoints including specific process and outcome measures to assess the feasibility and effectiveness of existing models.

**Results/Outcome(s):** Of the 462 studies identified, 3 articles (in abstract form only) met the criteria for an asynchronous vMCC and were included in the review. An additional 4 articles met the criteria for a synchronous vMCC and were also included. Only one synchronous rectal cancer-specific vMCC was identified. The included studies demonstrated feasibility of obtaining clinical consensus within a timely fashion, improved adherence to clinical practice guidelines, a change in management plan in up to 53% of patients, and improved participation in clinical trials. Participant satisfaction with the process was variable. Identified barriers to implementation included time constraints for synchronous platforms, technical support issues, and concerns regarding lack of participant remuneration.

**Conclusions/Discussion:** There is a paucity of literature on the feasibility and effectiveness of a vMCC model for cancer patient management. Based on the limited available evidence, there is potential for vMCC frameworks to improve the quality of cancer care but further study is warranted. We plan on designing and implementing an asynchronous, rectal cancer-specific vMCC at our institution to assess the feasibility and effectiveness of this novel approach.

#### SALVAGE TME FOLLOWING TEM: A POSSIBLE INDICATION FOR TATME.

P183

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**Purpose/Background:** A major pitfall with the transanal endoscopic microsurgery (TEM) approach for rectal adenomas and select early cancers is the possibility of

preoperative understaging with the subsequent need for salvage surgery. Salvage surgery after TEM has shown mixed results with adequate early oncologic outcomes but higher rates of abdominoperineal resection, morbidity and rectal perforations. Transanal total mesorectal excision (TaTME) might be advantageous in this population. The aim of this study was to assess the short-term oncologic and operative outcomes of TaTME after TEM when compared to conventional TME after TEM.

**Methods/Interventions:** At St. Paul's Hospital in Vancouver, TEM has been performed since 2007 and data for all patients has been prospectively collected and maintained in the SPH-TEM database. All consecutive patients treated with salvage TME after primary TEM were identified. Patients who underwent TaTME were compared to those who underwent conventional TME (C-TME). Primary outcome was the ability to perform an appropriate oncologic procedure while secondary outcomes included successful reconstruction rate, 30 day operative morbidity and length of hospital stay.

**Results/Outcome(s):** During the study period, 616 patients underwent TEM, among which 41 patients underwent subsequent salvage TME. Of those, 11 patients had TaTME while 30 patients had C-TME. Patients in both groups had similar demographics characteristics except for significantly lower and large tumor in the TaTME group. All patients in the TATME group met the composite outcome of appropriate oncologic procedure (negative distal margins, negative radial margins and complete or near complete mesorectum specimen) compared to 76.7% for the C-TME group ( $p = 0.19$ ). TaTME was associated with significantly higher rates of sphincter preservation (100% vs. 50%,  $p = 0.01$ ), higher rates of laparoscopic surgery (100% vs. 23.3%,  $p < 0.001$ ) and lower rates of conversion to open surgery (9.1% vs. 57%,  $p < 0.001$ ). No difference was found in postoperative morbidity (36.3% vs. 36.7%,  $p = 0.77$ ) and median length of stay (6 days vs. 7 days,  $p = 0.36$ ).

**Conclusions/Discussion:** The present study demonstrates that for patients requiring salvage surgery after TEM, TaTME is associated with significantly higher rates of sphincter-sparing surgery and laparoscopy when compared to conventional transabdominal TME while producing adequate short-term oncologic outcomes. This specific population might represent a clear indication where TaTME should be favored over conventional surgery.

### LONGITUDINAL ANALYSIS OF ANAL DYSPLASIA IN HIGH- AND LOW-RISK PATIENTS.

P184

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**Purpose/Background:** Anal dysplasia can progress to invasive squamous-cell carcinoma of the anus. However, the rate of progression is still under investigation, and most studies focus on high-risk patients. Our goal was to evaluate the long-term outcomes for high and low risk anal dysplasia patients.

**Methods/Interventions:** Longitudinal analysis of a prospective departmental database was performed from 9/1995-11/2014 for patients with anal condyloma, low-grade dysplasia (AIN I, low grade squamous intraepithelial lesion), high-grade dysplasia (carcinoma in situ, severe dysplasia, high grade squamous intraepithelial lesion, AIN II or III), and anal cancer. Patients were stratified into high-risk (HIV-positive/AIDS) and low-risk cohorts. The main outcome measures were progression rates and time to anal cancer across groups.

**Results/Outcome(s):** During the study period, 70 high-risk and 50 low-risk patients were followed. The high-risk group had a longer surveillance interval than the low-risk group (95 vs. 59 months, respectively;  $p=0.002$ ). At initial screening, the majority in both cohorts had no dysplasia (72.9% high-risk, 66.0% low-risk). High-grade dysplasia developed in 13 (18.6%) high-risk and 10 (20.0%) low-risk patients ( $p=0.894$ ), and invasive cancer in 10 (14.3%) high-risk and 4 (8.0%) low-risk patients ( $p=0.391$ ). Only 4/10 high-risk and 2/4 low-risk patients had a diagnosis of high-grade dysplasia before diagnosis of invasive cancer. For those that developed cancer, there was an extended

time period (mean 70.6 month high-risk, 89 months low-risk;  $p=0.576$ ) prior to diagnosis, with significant disparity in the number of visits across patient groups (66 high-risk, 14 low-risk;  $p<0.001$ ).

**Conclusions/Discussion:** Low risk patients have rates of progression to dysplasia and anal cancer similar to high-risk patients over time. Given these trends, regular screening for extended intervals in all patients is emphasized. This work has implications for stratifying future screening and therapy. Further controlled trials are warranted for definitive recommendations.

### PREDICTORS OF RECURRENCE OF ANAL DYSPLASIA.

P185

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**Purpose/Background:** The Human Papilloma Virus (HPV) is the most common sexually transmitted disease in the US and a major risk factor for developing anal dysplasia and anal squamous cell carcinoma (ASCC). In high risk populations, such as human immunodeficiency virus (HIV) positive men who have sex with men, the prevalence of high grade dysplasia (HGD), also known as anal intraepithelial neoplasia (AIN) II and AIN III, has been reported to be 30-52%. Currently, no treatment has been shown superior in reducing recurrence rates. Recurrence rates three years out from therapy are 77% regardless of treatment modality. Data is limited on identifiers that predict recurrence of anal dysplasia. The aim of this study is to identify factors that predict recurrence in patients with anal dysplasia.

#### P184 Anal Dysplasia Longitudinal Outcomes

Dysplasia Patients	High Risk (n=70)	Low Risk (n=50)	p-value
Gender (n, %)			0.317
Male	66 (94.3%)	44 (88%)	
Female	4 (5.7%)	6 (12%)	
Mean age, years (SD)	39.05 (8.51)	41.11 (11.25)	0.623
Median Follow-Up Interval, months (IQR)	95 (62-175)	59 (42-90)	0.002
Mean Number of Surveillance Visits (SD)	14.2 (10.9)	9.5 (4.6)	0.005
Initial Screening Pathology			
No Dysplasia	51 (72.9%)	33 (66.0%)	0.427
Low Grade Dysplasia	6 (8.6%)	7 (14.0%)	0.768
High Grade Dysplasia	13 (18.5%)	9 (18.0%)	1.000
Invasive Cancer	-	1 (2.0%)	1.000
Development of High Grade Dysplasia (n, %)	13 (18.6%)	10 (20.0%)	0.894
Total Progression to Anal cancer (n, %)	10 (14.3%)	4 (8.0%)	0.391
High Grade Dysplasia Progression to Anal cancer (n, %)	4 (5.7%)	2 (4.0%)	0.837

**Methods/Interventions:** A retrospective review of a prospectively maintained database was conducted at a major tertiary care hospital to investigate all patients who underwent treatment for AIN between July 1, 2013 and June 30, 2015. Patients were included if they met the following criteria: age 18-99 with a new diagnosis of AIN I, II, III on preoperative anoscopy. Patients were excluded if they had a history of ASCC or anal dysplasia, incomplete charts, post-operative diagnosis of anal condyloma without AIN, inflammatory bowel disease, and prior pelvic radiation for anal, rectal, or cervical cancer. Recurrence was estimated by the Kaplan-Meier method. Variables predictive of recurrence were determined using a multivariate regression analysis. All statistical analysis was performed using STATA (College Station, TX). The level of significance was set at  $p < 0.05$ .

**Results/Outcome(s):** A total 226 patients were identified. Of these, 106 patients met inclusion criteria of which 56 were removed due to exclusion criteria leaving 50 patients for analysis. The mean follow up was 16.1 months (SD 1.02). The mean age and BMI was 35.7 (SD 1.4) and 25.6 (SD 0.78) respectively. The majority of the patients were male, HIV positive, and on HAART therapy (90%, 90%, 86% respectively). The CD4 count and viral load were divided into quantitative categories. The majority of patients had a CD4 count greater than 200 (72%), a viral load of less than 500,000 copies (92%), and a combination of excision and fulguration as the main treatment strategy (90%). Postop diagnosis rate of AIN I, II, III were found to be 48%, 14%, 34% respectively. Recurrence rate at 6, 12, and 24 months were 19%, 53.5%, and 83.4%, respectively. CD4 count, specifically counts between 100 and 200, was the only factor predictive of disease free interval after performing a multivariate regression analysis.

**Conclusions/Discussion:** The recurrence rate of anal dysplasia is high. CD4 count was the only variable associated with a shorter interval of recurrence of anal dysplasia and should be considered in future models to predict recurrence.

#### TRANSANAL OPEN HEMORRHOIDOPEXY: GOOD RESULTS AFTER A FOLLOW UP OF 8 YEARS.

P186

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**Purpose/Background:** We evaluated the results after Transanal Open Hemorrhoidopexy, first publication in DCR 2009, after a follow up of at least 8 years.

**Methods/Interventions:** All patients had rectal mucosal prolapse combined with II-III degree hemorrhoids. In lithotomy position and under general anesthesia the rectal mucosa was lifted and fixed by Z-stitches four centimeters above the hemorrhoidal base after infiltration with

adrenaline solution (1:100,000 dilutions) and removal of a small rectal mucosa flap. Z-stitches were positioned in up to four segments of the lower rectum dependent on the size of prolapse. Postoperatively all patients received a fiber rich diet. In case of pain diclofenac and metamizol was prescribed. Out of 148 patients operated more than 8 years ago 27 were alive and capable of answering a questionnaire in person or in a telephone interview.

**Results/Outcome(s):** There had been no perioperative complications. Follow up was 96 months at least (median 110.8). Indication for the operation was symptomatic 2° or 3° hemorrhoids. Leading symptom was bleeding (n=17) and discomfort (n=17). Immediately after the operation the symptoms had improved considerably or completely in 18 patients (66.7%). At the time of the interview 18 patients (66.7%) had no complaints, while 8 patients (29.6%) reported symptoms. 20 patients (74.1%) would decide for Transanal Open Hemorrhoidopexy again, while 5 patients would not (18.5%). In 4 patients (14.8%) a second operation after Transanal Open Hemorrhoidopexy had been performed.

**Conclusions/Discussion:** More than 8 years after the operation more than two out of three patients are free of symptoms. Only 4 patients (14.8%) had a second operation. Transanal Open Hemorrhoidopexy is a safe operation with encouraging short term and long term results and should be part of the therapeutic algorithm for symptomatic hemorrhoids

#### A FECAL DIVERTING DEVICE FOR THE SUBSTITUTION OF DEFUNCTIONING STOMA.

P187

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**Purpose/Background:** A newly made fecal diverting device (FDD) showed the safety and effectiveness in the protection of ischemic colonic anastomosis in animal study. This study was enhanced to identify the safety and effectiveness of the FDD procedure clinically.

**Methods/Interventions:** FDD is a tubular device made of silicone. There are two tire-like dumbbell shaped outer balloons on the head portion of the device which help to fix the device on the colon proximal to the anastomotic area without sutures. An absorbable PGLA (poly glycolide-co-L-lactide) mesh band was used to fix the head portion of the device externally on the colon. Inside the head portion of the device, there is an inner balloon, which permits or blocks the flow of the bowel contents. The tail, i.e. the thin tube below the head portion, is long enough to hang out from the anus. Daily bowel movement was achieved by tepid water irrigation of the bowel content via the FDD twice a day. Removal of FDD is achieved by pulling the tail of the device after decompression of outer balloons without anesthesia. A prospective observational trial was

performed on 28 benign or malignant rectal disease patients (age; 65.5; median, range 34-85, 20 males) with high risk of anastomotic leakage (AL) in tertiary referral university hospital from May 1, 2015 to Oct 27,2016. The FDD procedure comprised of intraoperative FDD installation after low rectal anastomosis and postoperative maintenance period for three weeks. Pelvic CT was done at one week postoperatively to identify clinical or subclinical AL. Contrast study was done before the removal of FDD at three weeks(Fig.). If the AL was noted, FDD was retained for three weeks more.

**Results/Outcome(s):** Twenty-four rectal cancer (four received preoperative chemoradiation therapy), three traumatic rectal perforation, and one megacolon patient were included in the trial. Procedures were achieved by 19 laparoscopic, 8 open and 2 robotic surgeries. Anastomotic wound location was 5(median,range 3-8) cm from anal verge. FDD were retained for 21 (Median, range 14-43) days. All, except one cases experienced scheduled removal of FDD. Evidence of anastomotic leakage was identified in seven (five within a week, two after 3 weeks) cases. For the five early AL cases, additional two or three week's maintenance of FDD was enough to preserve the anastomosis in four cases however, no additional period was needed in one subclinical AL case. For the two delayed AL cases, additional operation to reinsert FDD was performed. Erosion of band was noted in two cases however, there was no septic event due to FDD and FDD procedures. There was no mortality or significant morbidity.

**Conclusions/Discussion:** FDD procedure was effective in the prevention of dismal septic cascade in case of anastomotic leakage. There was no significant complication about FDD procedure. However, to identify the clinical usefulness of FDD, comparative study with stoma should be performed in the future.



**TRANSANAL OPENING OF INTERSPHINCTERIC SPACE - A SIMPLE NOVEL SPHINCTER-SPARING PROCEDURE TO TREAT HIGH COMPLEX CRYPTOGLANDULAR FISTULA-IN-ANO.**

P188

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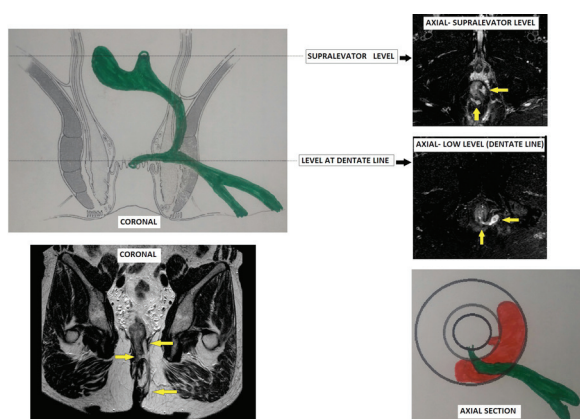
**Purpose/Background:** Deep posterior intersphincteric space has important role in pathogenesis of most complex fistula-in-ano. The sepsis in the intersphincteric space is like a small abscess in a closed space. This closed space needs to be drained adequately and then kept open for proper healing of the fistula-in-ano. The objective was to lay open and drain the intersphincteric space through internal opening via transanal approach

**Methods/Interventions:** In a prospective non-controlled study, all consecutive patients of complex high fistula-in-ano operated in a referral center were included in the study. 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 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 was cut with electrocautery. The intersphincteric portion of the fistula tract was thus laid open on the medial (luminal) side. The incision was usually curvilinear but could also be oblique, depending upon the direction of the intersphincteric tract. The incision started from the internal opening, which was mostly at the dentate line. In case of horseshoe fistula, the incision extended on both sides of the midline posterior internal opening. In case of an additional supralelevator opening of the fistula in the rectum (Figure-1), the incision was extended from the midline posterior internal opening up to the supralelevator rectal opening.

**Results/Outcome(s):** 61 patients with high complex fistula-in-ano with a follow-up of 4-21 months (median-7 months) were included. Male/Female: 59/2, age-42.3  $\pm$ 9.5 years. 85.2% (52) were recurrent, 83.6% (51) had multiple tracts, 36.1% (22) had horseshoe tract, 34.4%(21) had supralelevator extension and 26.2% (16) had associated abscess. 95.1% (58) were posterior fistula out of which 90.2% (55) were in posterior midline. Nine patients were excluded (Six tested positive for tuberculosis, two lost to follow-up, one excluded). Fistula healed completely in 84.6%(44/52) and didn't heal in 15.4% (9/52). 4/9 of these were reoperated and fistula healed in three patients. Thus overall healing rate was 90.4% (47/52). There was no significant change in incontinence scores.

**Conclusions/Discussion:** The success rate of TROPIS(>90%) in high and complex fistula(majority were recurrent fistula with multiple tracts, horseshoe tracts and supralelevator extension) is quite impressive. The external sphincter is not cut or damaged due to which the risk to continence is minimized. The technique is simple, easy to reproduce, associated with little pain and early resumption of normal activities.



A high complex fistula in a 47 year old male patient managed by TROPIS procedure. The patient had a transsphincteric fistula on left side at 4 o'clock position, supralelevator extensions at 3 & 6 o'clock position and a supralelevator rectal opening at 3 o'clock position.

Left upper: Coronal section (Schematic diagram).

Left lower- Coronal section (MRI),

Right upper: Axial section - high at supralelevator level (MRI),

Right middle: Axial section - low at dentate line (MRI),

Right lower: Axial section (Schematic diagram), red color indicates deep posterior intersphincteric space

## PROSPECTIVE RANDOMIZED EVALUATION OF TRANSANAL HEMORRHOIDAL DEARTERIALIZATION WITH MUCOPEXY VERSUS STAPLED HEMORRHOIDOPEXY IN HEMORRHOIDAL MUCOSAL PROLAPSE: A LONG FOLLOW UP.

P189

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**Purpose/Background:** The aim of this study was to compare early and late outcome of Transanal Haemorrhoidal Dearterialization with Mucopexy (THD-M) versus Stapled Haemorrhoidopexy (SH) for the treatment of haemorrhoidal mucosal prolapse. Primary outcome was to compare the recurrence rate. Secondary outcome was to compare both of these techniques in relation to complications rate, time to return to work, procedure length and patients satisfaction.

**Methods/Interventions:** From January 2011 to December 2012, 100 patients - 50 patients on each arm- were randomly allocated to THD-M or SH group. We included patients with symptomatic reducible haemorrhoidal mucosal prolapse without symptoms of obstructed defecation neither previous proctologic operations or pelvic-perineal radiotherapy. The preoperative assessment consisted of the clinical history and proctoscopy. Stapled haemorrhoidopexy was performed with a dedicated circular stapling device. THD was performed using a specifically designed proctoscope which incorporates a side-sensing Doppler probe and also a mucopexy was performed. Patients were visited at the outpatient clinic at day 15 and then 1, 3 and 12 months after surgery and reassessed with a telephone interview every year.

**Results/Outcome(s):** The mean follow up period was 58,5 (range 47-71) months. Overall complication rate of THD-M group was 16% versus 12% in SH group (Ns), in particular: pain scores was higher in the THD-M group ( $P < 0,05$ ) and urgency was higher in the SH group (Ns). Mean operative time was shorter in the SH group ( $P < 0,05$ ). Time to return to work was shorter in the SH group ( $P < 0,05$ ). Recurrence were significantly less in the SH group ( $P < 0,05$ ). Overall satisfactory rate was higher in the SH group ( $P < 0,05$ ).

**Conclusions/Discussion:** SH and THD-M are both safe and effective day-care procedures for the treatment of haemorrhoidal mucosal prolapse. In our series SH showed better statistical significant results in term of post-operative pain, return to work and patient satisfaction. We recorded more urgency in SH group and we observed in these group of patients that they also suffered of irritable bowel syndrome (IBS). On the basis of this experience, currently in our practice when patients have haemorrhoidal prolapse and IBS we usually do not perform resective surgery. Our follow up demonstrated that both SH and THD-M had a lower rate of recurrency but in our series SH was significantly better.

#### ANATOMIC CHARACTERISTICS OF TYPE AND POSITION OF THE ANAL FISTULA ON THREE-DIMENSIONAL ANORECTAL ULTRASONOGRAPHY.

P190

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**Purpose/Background:** Endoanal ultrasound and magnetic resonance imaging represent currently the imaging strategies for evaluating perianal fistulas and may be used alone or in combination to choose the best treatment option. So the aim of this study was to evaluate the anatomical position of the fistula's tract(T) course, location of the internal(IO) and external opening(EO) and type of fistulas by three-dimensional anorectal ultrasonography(3D-US) compared with clinical examination according with Goodsalls rule and the surgical finding.

**Methods/Interventions:** A total of 415 patients with cryptoglandular fistulas underwent clinical examination, 3D-US and surgical treatment from 2012-2016 were identified from a prospective database. The type of T(radial or curved course), Park's classification, EO and IO were identified and the patients were grouped according to genders, type of fistula and position of the EO and IO

located anterior(A) or posteriorly(P) to the transverse anal line; and compared with US-3D, clinical examination according Goodsall's rule and surgical findings. Student t test and Fisher's exact test were used.

**Results/Outcome(s):** Overall, 299/72% were transsphincteric, 111/27% intersphincteric and 5/1% suprasphincteric. 325/78% were male, mean age 42y, of them 145/45% with the EO and IO located anteriorly (35% with curved T and 66% radial) and 180/55% located posteriorly (23% with curved T and 77% radial). 90/22% were female, mean age 38y, of them 48/53% with the EO an IO located anteriorly (54% with curved T and 22% radial) and 22/46% located posteriorly(33% with curved T and 67% radial). Secondary tract was found in 22%. The prevalence of curved T was higher in female with the EO and IO located anteriorly compared with male and the prevalence of radial T course was higher in male with the EO and IO located anteriorly compared with female, Table. Secondary tract was found in 22%. The overall concordance between 3D-US and surgical finding was 98% for main T, 97% for secondary T and 99% for IO.

**Conclusions/Discussion:** Transsphincteric fistula is the most prevalent in both gender. The radial T course is prevalent in both A and P positions of the EO and IO in male and posteriorly in female. The 3D-US demonstrated that Goodsall's rule is accurate in describing the course of anal fistula with anterior EO in male with radial T in 66% and it is inaccurate in posterior EO tract in a curved manner in only 23%. It is also inaccurate in female in both A and P positions as fistula with anterior EO had radial course in 22% and in those with posterior EO location, the T was curved in only 33% in both type of anal fistula. So, it is indicated a preoperative image test to identify the IO and the course of fistula tract.

**P190 Type and position of the anal fistula on three-dimensional anorectal ultrasonography-3D-US**

3D-US FINDINGS	MALE 325 (78%)	FEMALE 90 (22%)	P
<b>FISTULA CLASSIFICATION</b>			
Transsphincteric	226 (69%)	73 (81%)	0.03
Intersphincteric	94 (29%)	17 (19%)	0.5
Suprasphincteric	5 (2%)	0	
<b>TRACT COURSE</b>			
CURVED ANTERIOR	49 (34%)	26 (54%)	0.01
RADIAL ANTERIOR	96 (66%)	22 (46%)	0.01
CURVED POSTERIOR	41 (23%)	14 (33%)	0.16
RADIAL POSTERIOR	139 (77%)	28 (67%)	0.16



### TRANSCUTANEOUS TIBIAL NERVE STIMULATION FOR FECAL INCONTINENCE: FIRST RESULTS OF A PILOT STUDY.

P191

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**Purpose/Background:** Transcutaneous posterior tibial nerve stimulation (tpTNS) is a newer, non invasive and cheap method to treat patients with moderate fecal incontinence. In a pilot study, we evaluated the efficacy and feasibility of this technique.

**Methods/Interventions:** Patients with fecal incontinence and former biofeedback therapy were enrolled for the study. Before and after 3 months, we recorded the Wexner Score, the Fecal Incontinence Quality of Life Scale (FIQL) and performed a sphincter manometrie. All patients were introduced to the method and the equipment (Lancy®) and started a therapy for 3 months.

**Results/Outcome(s):** 15 patients (13 females) with a median age of 65 years (range from 20-80 yrs) fulfilled the inclusion criteria and received a tpTNS for 3 months. No complication occurred. 14 patients noticed an improvement of their fecal incontinence. Median Wexner was preinterventionally 15 (range 11-18) and after 3 months 8 (range 7-18). No manometric changes and no variations in all 4 components of the FIQL were documented. One patient did not improve and already received a magnetic sphincter augmentation (FENIX®).

**Conclusions/Discussion:** TpTNS is easy to perform, non invasive and good for an outpatient use. Further randomized controlled studies with more patients are necessary for better evaluation of the therapy.

### HAEMORRHOIDS TREATMENT WITH THD PROCEDURE: A CASE SERIES OF 280 CONSECUTIVE PATIENTS.

P192

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**Purpose/Background:** Transanal hemorrhoidal dearterialization (THD) is a recently introduced technique which permits a new approach in treating hemorrhoids. By means of a dedicated proctoscope, combined with a properly shaped Doppler Probe, it both allows for transanal Doppler-guided ligation of hemorrhoidal arteries and mucopexy of the anal canal submucosa. This is a retrospective analysis of our first series of patients treated with this technique. The aim of this retrospective study is to evaluate safety and efficacy in THD treatment of hemorrhoidal disease.

**Methods/Interventions:** Between January 2011 and June 2016, 280 patients with grade II, III, and IV

hemorrhoids were submitted for transanal hemorrhoidal dearterialization and anal canal mucopexy carried out as a day case procedure under spinal anesthesia. Ligation of six hemorrhoidal arteries branches was performed in all patients. Patients were evaluated at 1 week, 1 month, 1 year and then once a year. At 1 week patients were only submitted to a clinical interview aimed to assess postoperative pain, rectal tenesmus and haematochezia. Following evaluations also consisted of digital rectal examination and anoscopy.

**Results/Outcome(s):** A total of 284 patients (mean age: 60, M/F: 1.5:1) underwent THD procedure for hemorrhoidal disease with this occurring as grade II in 65 patients (23%), grade III in 178 patients (63%) and grade IV in 41 patients (14%). Postoperative complications occurred in 3,5% of patients (7 bleeding and 3 acute thrombosis). Both preoperative bleeding and anal pain have showed to significantly improve in the postoperative time ( $p < 0.001$ ), even in the long term follow-up. Recurrence rate after surgery was 18% at 1 month, 17% at 3-12 months, 15% at more than 12 months follow-up. Preoperative grade prolapse is not related to 1 year recurrence (P value: 0.68). Preoperative disease severity does not impact on the patients outcome at one year and more after surgery and does not correlate to risk of recurrence either (p value: 0.07). Chronic pain and fecal incontinence were not observed in our series; However some patients complained of immediate postoperative self-limited rectal tenesmus and fecal urgency.

**Conclusions/Discussion:** Transanal haemorrhoidal dearterialization (THD) is to be considered a minimally invasive procedure, both safe and effective in the surgical approach of haemorrhoidal disease. This one of the largest series of patients treated with THD method and with the longest follow-up. Our series demonstrate short and long-term effectiveness of this procedure together with a low complication rate.

### CHARACTERISTICS AND OUTCOME OF FOURNIER'S GANGRENE ORIGINATING FROM THE ANORECTAL REGION, WITH A PARTICULAR FOCUS ON CASES WITH NO PERINEAL INVOLVEMENT.

P193

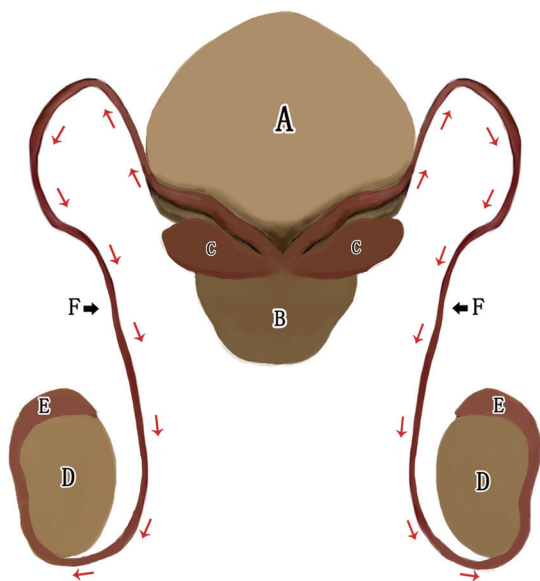
H. Lin, Z. Chen, H. Chen, J. Li, Q. Zhou, Y. Xu, R. Shi,  
D. Ren  
*Guangzhou, China; Fuzhou, China*

**Purpose/Background:** To explore the clinical features of Fournier's gangrene (FG) originating from the anorectal region, with a particular focus on cases with no perineal involvement (NPI). To explore the clinical features of Fournier's gangrene (FG) originating from the anorectal region, with a particular focus on cases with no perineal involvement (NPI).

**Methods/Interventions:** Patients diagnosed with FG originating from the anorectal region from January 1995 to February 2016 were identified. Demographics and clinical data, including diagnostic imaging, surgical and postoperative management, were collected, and compared between patients with perineal involvement (PI) and those with NPI.

**Results/Outcome(s):** A total of 39 patients, 33 (84.6%) with PI and 6 (15.4%) with NPI, were included. Based on imaging data, the involvement of the supralevator space was identified in five PI and all six NPI cases (15.15% vs. 100%,  $P=0.081$ ). In all six NPI cases, infection in the ischiorectal fossa was communicated with the supralevator space through the levator ani muscle. During surgical exploration, the inguinal canal was found to be communicated with the retroperineal space and supralevator space by FG. *Streptococcus hemolyticus* was found in two PI and all six NPI cases (7.4% vs. 100%,  $P=0.001$ ). Only one patient underwent preventive colostomy. At 1-year follow-up, the median Wexner incontinence score (4 vs. 4) was similar between the two groups.

**Conclusions/Discussion:** Unlike PI cases, the route of infection in NPI cases seems to extend upwards to involve the levator ani muscle rather than anterior involvement of the perineal region; In addition, *S. hemolyticus* may be associated with NPI. In both PI and NPI cases, preventive colostomy is not mandatory.



Bladder (A); Prostate gland (B); Seminal vesicle (C); Testis (D); Epididymis (E); Ductus deferens (F).

Red arrows show: seminal vesicles were involved and then infection might spread along the deferent duct to the inguinal region, consequently affecting the scrotum.

## COMPARISON OF ACELLULAR DERMAL MATRIX PLUG VERSUS LIGATION OF THE INTERSPHINCTERIC FISTULA TRACT FOR THE TREATMENT OF FISTULA-IN-ANO.

P194

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**Purpose/Background:** Surgical treatment of anal fistula is challenging. The aim of this study was to compare two sphincter-saving procedure for fistula-in-ano: Acellular Dermal Matrix (ADM) plug versus Ligation of the Intersphincteric Fistula Tract (LIFT) with particular attention to healing time, recurrence, complication rate and continence impairing.

**Methods/Interventions:** This is a retrospective analysis from a prospective database. Between October 2012 to May 2016, 64 consecutive patients were enrolled. 38 patients underwent ADM-plug positioning (group A) and 26 patients underwent LIFT (group B). A seton was placed in all the ADM-plug group patients before the procedure, while only 5 LIFT group patients needed it. All patients underwent pre-operative clinical examination, proctoscopy and transanal ultrasonography or MRI. The Wexner Incontinence score was administered before and after surgery. Patients were visited at the outpatient clinic at day 15 and then 1, 3, 12 and 24 months after surgery and reassessed with a telephone interview every year.

**Results/Outcome(s):** 64 overall patients were studied. In the group A, the median follow-up was 15 months (range 6 - 29); in the group B the median follow-up was 26 months (range 12-48). Median healing time in the LIFT group was 40 days (range 30-50) while in the ADM group it was 55 days (range 30-75) ( $P<0,001$ ). We reported 5 recurrences (13%) in the ADM group versus 7 (27%) reported in the LIFT one ( $P=Ns$ ). Post-operative pain, evaluated using the VAS-score, was similar in both groups. No major complications were reported, no impairment of continence was observed and no difference reported in Wexner Incontinence score before and after surgery in both group.

**Conclusions/Discussion:** LIFT and ADM-plug are both safe and effective sphincter-saving procedure for fistula-in-ano. In our series ADM was characterized by a lower recurrence rate even if a longer healing time. On the basis of this experience, currently in our practice we usually prefer ADM-plug in primary anal fistula.

## LASER-MODIFIED VAAFT TECHNIQUE FOR COMPLEX ANAL FISTULA.

P195

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**Purpose/Background:** Video Assisted Anal Fistula Treatment (VAAFT), a novel endoscopic surgical procedure for complex anal fistula, has been studied with variable success rates (52,5-92,55) compared with initial reports. Laser videoassisted ablation of fistula tracts is proposed as a change to Meinero technique.

**Methods/Interventions:** This retrospective review assesses outcomes of patients undergoing laser modified VAAFT technique. All patients underwent the diagnostic phase following Meinero steps; the changed operative phase includes a preventive - under vision- cleaning/ courettage and a successive fistula tract walls destruction by means of a radial laser probe inserted in the fistuloscope. Internal fistula opening was sistemically closed by a rectal advancement flap

**Results/Outcome(s):** Fifty laser modified VAAFT procedures were performed. The main cohort consisted of patients predominantly men (72%). Median follow up was 18,6 months. Median operative time was 41 minutes. Primary healing rate was 84% with a recurrence rate of 4% and fistula persistence in 12 %. One major complication (anovaginal fistula) occurred. There was no persistent fecal incontinence.

**Conclusions/Discussion:** Laser modified VAAFT is a safe procedure that is easily performed and has promising cure rates. This approach combines the advantages of laser energy devices to destroy the cronicly inflammed connective tissue of fistula tracts with a direct under vision management of fistula branches.

## EARLY AND ONE-YEAR RESULTS OF LASER HAEMORRHOIDOPLASTY FOR SYMPTOMATIC HAEMORRHOIDS.

P196

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**Purpose/Background:** A hemorrhoidectomy is the standard treatment for patients with grade I to IV hemorrhoids. According to the "vascular" theory, arterial overflow in the superior hemorrhoidal arteries would lead to dilatation of the hemorrhoidal venous plexus. Hemorrhoid laser procedure (LHP) is a new laser procedure for outpatient treatment of hemorrhoids in which hemorrhoidal arterial flow feeding the hemorrhoidal plexus is stopped by laser coagulation. This study aimed to describe the clinical results of hemorrhoidal application of a diode laser.

**Methods/Interventions:** Patients with symptomatic internal first to fourth degree haemorrhoids underwent laser haemorrhoidoplasty procedure with Biolitec diode laser. The patients were examined after 6 weeks after the operation. The questionnaires were mailed to the patients 13 months after the operation, non-responders were interviewed over the phone

**Results/Outcome(s):** 229 patients underwent laser haemorrhoidoplasty from March 2011 to December 2014 in four institutions. Mean age was 44.4 years (20–81 years). 118 patients were male (51.5%). 855 Joules of laser energy were used on average (510–1586 J) per patient. 108 patients (47.2%) underwent mucopexy in addition to laser haemorrhoidoplasty procedure. No intraoperative complications occurred. 1 patient (0.4%) bled after the procedure, the bleeding required re-admission on postoperative day 4, but stopped spontaneously without surgical intervention. 101 patients (44%) responded to the questionnaire on average 13 months after the operation. 45 patients (44% of responders) had postoperative pain of 1 week duration or less. 4 (4%) patients underwent repeated treatment for haemorrhoids; 98 percent were satisfied with the procedure performed

**Conclusions/Discussion:** Laser haemorrhoidoplasty procedure is safe, effective and relatively pain free treatment for symptomatic haemorrhoids

## VACUUM SEALING DRAINAGE TECHNOLOGY IN MANAGEMENT OF CAVITY WOUND CAUSED BY ANORECTAL DISEASE: A PRELIMINARY STUDY.

P197

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**Purpose/Background:** Acute suppurative infection in soft tissues around the anorectal region and the radical excision of presacral tumor often results in cavity wound, which are characterized by large and deep surgical lesion. These cavity wound resulted in common postoperative problems including anal incontinence, delayed healing, long hospital stay, postoperative wound pain during dressing, and tremendous mental distress. Vacuum sealing drainage (VSD) technology is an arisen new approach in recent years to promote wound repair which has been widely used in all sorts of traumatic wound treatment and considered safe and reliable. Therefore, this study is to explore the safety and efficacy of VSD technology in management of cavity wound caused by anorectal disease.

**Methods/Interventions:** Patients with cavity wound caused by anorectal disease were identified. If wound types extend below the subdermal layers of the skin and expose underlying structures such as tendons, muscle, and bone, they are referred to as "cavity wounds". Demographics and clinical data, including predisposing factors, times of

VSD used, surgical and postoperative management, were collected and analysed.

**Results/Outcome(s):** Twelve eligible patients underwent VSD. Infection in all the case was under controlled. The demographic and clinical characteristics was listed in **Table 1**. The blood loss in patients was 50 ml (range, 10~150ml). The mean postoperative visual analog scale score for pain was 3 (range, 1~4), 2 (range, 1~4), 3 (range, 2~6), 1 (range, 0~3), and 1 (range, 0~2) at 12 h, days 1, 2, 3, and 7. No patients developed anal incontinence. The averaged healing time was  $24.2 \pm 7.6$  days.

**Conclusions/Discussion:** The VSD technique seems to be beneficial to facilitate wound healing, relieve the postoperative pain, shorten hospital stay. It appeared that VSD is a safe and effective technique in management of cavity wound caused by anorectal disease.

## HEMORRHOID ENERGY THERAPY IN THE MANAGEMENT OF SYMPTOMATIC GRADE 1 AND GRADE 2 HEMORRHOIDS.

P198

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**Purpose/Background:** Approximately 5% of the American population present with symptomatic hemorrhoids. Bleeding with defecation is the most common presenting symptom. Current outpatient treatment options include rubber-band ligation, sclerotherapy and infrared coagulation. These procedures often require several visits for therapy. This study aims to evaluate the effectiveness of a novel outpatient therapy, HET™ Bipolar Device (Covidien), in the treatment of grade 1 and 2 internal hemorrhoids. The device is a modified anoscope which is equipped with a LED light, tissue clamping mechanism and bipolar energy device.

**Methods/Interventions:** This is an ongoing prospective study, enrolling patients with symptomatic grade 1 or 2 internal hemorrhoids. A total of 30 patients will be

### P197 Demographic and Clinical Characteristics of 12 Patients with VSD

Patients	Age/years	Etiology	Predisposing conditions	Location of lesions	Concurrent illnesses	Times of VSD used	infection	Time for wound healing/ days
1	39	perianal abscess	Diabetes	Sacrococcygeal region	-	3	Under control	30
2	48	Rectal carcinoma	-	Sacrococcygeal region	-	2	Under control	18
3	37	Fournier gangrene	Diabetes	Scrotum,Perineum ,Thigh	Leukemia	1	Under control	36
4	16	Presacral tumor	-	Presacral space	-	3	Under control	32
5	27	Presacral tumor	-	Presacral space	-	1	Under control	24
6	35	Fournier gangrene	Diabetes	Scrotum,Perineum ,Thigh	-	2	Under control	23
7	52	Pelvic abscess	-	Pelvic	-	1	Under control	20
8	66	Pelvic abscess	-	Pelvic	Hepatitis	1	Under control	33
9	40	Presacral tumor	-	Presacral space	-	2	Under control	20
10	39	Pilonidal sinus	-	Sacrococcygeal region	-	1	Under control	10
11	32	Pilonidal sinus	-	Sacrococcygeal region	-	1	Under control	18
12	81	Fournier gangrene	Diabetes	Thigh,buttock	Hypertension	2	Under control	26

included in the study at completion. Currently, 17 patients have been enrolled. A pre-treatment hemorrhoid symptom score, documenting the severity of symptoms (bleeding, pain, prolapse, itching, and soiling), was obtained from each patient prior to therapy. HET therapy was applied to each of the 3 hemorrhoid columns. Immediately following treatment a visual analogue score (VAS) score was obtained. Repeat hemorrhoid symptom scores were obtained at evaluations at 3 and 6 weeks post treatment. The primary outcome was to evaluate the effectiveness of HET therapy on hemorrhoid symptoms, as measured by the hemorrhoid symptom score before and after treatment. Secondary outcomes include assessing pain associated with therapy using a VAS score and changes in hemorrhoid grade on repeat examination 3 weeks after treatment.

**Results/Outcome(s):** 17 patients, 9 males and 8 females with a mean age of 51 (range 25-82) years underwent HET. 3 patients (17%) were lost to follow-up. The mean duration of symptoms was 32 months and rectal bleeding was the most common symptom. The hemorrhoid symptom score decreased from 3.6 before treatment to 2.5 after treatment ( $p=0.107$ ). Of the presenting symptoms, significant improvement was noted in bleeding ( $p<0.01$ ). The treatment was associated with mild pain, with a mean VAS score was 2.2 after treatment. Improvement in hemorrhoid grade was noted in 8 patients (57%), while 5 patients (36%) remained unchanged and 1 patient (7%) was worse. 3 (17%) patients experienced thrombosis of the internal hemorrhoid plexus secondary to the procedure, one of them requiring surgical intervention. No other complications were observed.

**Conclusions/Discussion:** HET therapy can be delivered at one treatment session and remains a promising alternative for symptomatic grade 1 and grade 2 hemorrhoids. The use of HET therapy reduced the symptom of bleeding associated with hemorrhoids. Further assessment of long-term efficacy and side effects is warranted.

#### DIRECT TO TEST GI COLONOSCOPY/ GASTROSCOPY HAS A LOW PICK-UP RATE FOR COLORECTAL CANCER AND IS FREQUENTLY ASSOCIATED WITH NEGATIVE FINDINGS IN THE UPPER GI TRACT.

P199

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**Purpose/Background:** Asymptomatic iron deficiency anaemia and /or altered bowel habit are considered red flag signs of gastrointestinal malignancy. Where both upper and lower endoscopy is planned, tradition dictates that the gastroscopy is performed first and will frequently include D2 biopsies to exclude Coeliac disease. To speed diagnosis, our Health Authority introduced 'direct to test'

investigations via a system of urgent referral. Patients from three hospitals undergo investigation at one centre. This presentation examines the clinical and pathological findings in a consecutive cohort of patients investigated under this directive.

**Methods/Interventions:** The departmental endoscopy database (unisoft) and in-house colorectal cancer database were cross-referenced to identify all patients from the three hospitals in our trust who were referred directly for upper and lower GI investigations, for anaemia and/or altered bowel habit. These were carried out under the urgent referral pathway between 01/02/2011 and 10/07/2016. This robust data was checked and quality assured by our Quality Improvement department. For all the identified patients, standard demographic data was recorded. Clinical letters, blood results, scope reports and pathology findings were examined. Relevant data including D2 biopsy rate and coeliac (TTG) antibody status were recorded on a purpose built database for analysis.

**Results/Outcome(s):** 432 patients underwent combined colonoscopy and gastroscopy as a consequence of general surgery or gastroenterology referrals from their general practitioners. Only 16 colorectal cancers (3.7%) were identified. One Upper Gastrointestinal cancer was identified (0.3%), and 44 patients (10.2%) were found to have colonic polyps. Additionally, 33% of patients had D<sub>2</sub> biopsies performed of which 95% were normal. 19% of patients had a Coeliac Screen (TTG antibody blood test) of which 93% were normal. Importantly in this cohort, malignancy was only ever diagnosed in the presence of anaemia. No malignant findings were identified in patients being referred on the basis of altered bowel habit/abdominal pain. All colorectal cancer patients had negative D<sub>2</sub> biopsies and Coeliac Screen.

**Conclusions/Discussion:** BSG Guidelines (2011) still indicate that upper GI endoscopy be performed first when both investigations are performed. Our results indicate that colonoscopy should be performed first and if positive, should not be followed by gastroscopy with routine biopsy of D<sub>2</sub>. Non-specific GI symptoms in the absence of anaemia have a very low colorectal cancer yield.

#### 5 YEAR INSTITUTIONAL EXPERIENCE AFTER INITIATION OF STATE SUPPORTED COLORECTAL CANCER SCREENING AND CARE.

P200

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**Purpose/Background:** Colorectal cancer is the third most common cause of death in both men and women in the United States. Historic models based on national databases have sought to identify populations that are the most at risk for both developing and succumbing to this

disease. Previously published literature has identified the black and elderly (>80 years) communities as at-risk populations. In the state of Delaware, screening colonoscopies are state supported, and cancer treatment is covered for up to 2 years. This has led to a significant decline in cancers diagnosed at advanced stages (from 63.7% to 54.6%), a decline in mortality rate by 28.3%, and Delaware's rank as the fourth highest in the nation for colorectal cancer screening. In order to continue this trend towards superior colorectal cancer outcomes, further research is required to identify which patients continue to present at later stages, and the medical and surgical methods used to identify and treat them.

**Methods/Interventions:** Retrospective review of all patients diagnosed with colon and rectal cancer in a single community cancer center in Delaware from 2011-2015. Demographics information such as race and sex, as well as cancer characteristics such as location of the tumor and preoperative CEA. Surgical margins, procedure performed, number of nodes derived and pathologic stage were also analyzed.

**Results/Outcome(s):** Descriptive characteristics of 870 patients were analyzed. Patient demographics were notable for a 51.6% male predominance, and a racial predominance of 77% white, with black as the second most common (18%). Half (50.3%) of patients did not have a documented preoperative CEA. Of the 88.2% of patients who were pathologically staged, most patients were Stage 1 (23.8%) or Stage 2 (26.2%). No racial disparities were noted, even in more advanced stages. From an operative standpoint, most cases were performed open (63.6%), though nearly a quarter (23.3%) were performed laparoscopically and 8.7% robotically. Surgical margins were negative in 91.9%. The average number of lymph nodes obtained was 22.2 (14-28).

**Conclusions/Discussion:** Compared to data derived by the Delaware Cancer Registry from 2006-2010, a slightly higher percentage of black and other non-Caucasians account for new diagnoses, implying an increase in screening in these groups. There is also a decline in cancer diagnosed at Stages 3 or 4, from 54.6% to 40.1%. In keeping with previous reports, 39.6% of patients continue to present in the local stage. Despite these improvements, there remains significant discordance in the clinical and pathologic stage, particularly in more advanced cancers. Though more cancers are being detected, and at more treatable stages, the best outcomes require accurate staging for proper management. Several opportunities for improvement include enhanced imaging modalities, increased participation in multidisciplinary teams and protocolization of pre- and postoperative care.

## HIGH RESOLUTION ANOSCOPY - STARTING A PROGRAM - INITIAL EXPERIENCE OF DETERMINING WHO SHOULD UNDERGO OPERATING ROOM HRA.

P201

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**Purpose/Background:** High resolution anoscopy (HRA) with directed biopsy has evolved as the standard for detecting anal intraepithelial neoplasia. This procedure can be done both in the office and the operating room. Practice parameters and standards have been set forth by high volume centers. As a new program it is important to reach these standards and determine which patients will benefit from HRA in the operating room. The purpose of this study was to compare in office and operative pathology results in high-risk patients.

**Methods/Interventions:** This was a retrospective cohort study conducted at a single tertiary care center. All patients undergoing HRA between July 2014 and October 2016 were included. Demographics, referrals patterns, and final pathology were evaluated.

**Results/Outcome(s):** Thirty-three patients were identified who have undergone HRA. Thirty patients were male (90%) of which, 26 were HIV positive (87%) and have been identified as a high-risk population. Reason for referrals included abnormal pap smears (45%), suspicious anal lesions (39%), history of AIN (12%) and incidental findings during other anal procedures (4%). Thirteen patients underwent in-office HRA. Eight of the HIV positive patients (31%) then underwent HRA in the operating room and demonstrated more invasive lesions than previously identified in the office evaluation.

**Conclusions/Discussion:** High resolution anoscopy in the operating room may offer the advantage of a more complete and thorough exam on high risk patients with abnormalities found on the office exam. As development of an HRA program requires a referral base, this may help to guide which patients should be evaluated by a surgeon.

## TRANSANAL TOTAL MESORECTAL EXCISION (TATME): SHORT-TERM SURGICAL OUTCOMES.

P202

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**Purpose/Background:** One of the pillars of surgical treatment is total mesorectal excision (TME). Classical abdominal TME has been recently challenged by new approaches. Transanal approach has theoretical benefits,

however we still lack strong evidence. We present our case series at a University Hospital.

**Methods/Interventions:** TaTME was introduced in 2012 at our institution. Since then, patients were prospectively enrolled in a database. We included patients with rectal cancer at < 10 cm from anal verge, eligibility criteria for TaTME was at least one of the following: narrow pelvis, obese patients, and intraoperative decision. Preoperative study included colonoscopy, rigid rectoscopy, pelvic MRI and Chest/Abdomen/Pelvis CT in all patients. Abdomen MRI, endorectal/endoanal ultrasound or PET-CT were performed for selected cases. Patients with cT3-4 or cN+ received neoadjuvant chemoradiation. Demographic and clinical data was obtained. TaTME was performed as part of an hybrid procedure, abdominal and transanal approach. Gelpoint® Path (Applied Medical Resources Corporation, CA) was used. After marking by electric diathermy at least 1 cm distal to the tumor, a 2-0 Prolene purse-string suture was placed. A pneumorectum/perirectum was created using a standard laparoscopic CO2 insufflator at a pressure of 12-15 mmHg. A 10-mm camera and conventional laparoscopic instruments were used. Surgical and postoperative data was collected. Postoperative complications were organized according to Clavien-Dindo classification.

**Results/Outcome(s):** A total of 37 patients were prospectively included for this study. Male to female ratio was 4.3:1 and mean age was  $56.9 \pm 13.3$  years old. Twenty four (64.8%) patients were overweight/obese. Mean distance from anal verge was 4.6 cm (range 1-10 cm). All patients, except one, received neoadjuvant therapy. Intersphincteric resection was performed in 15 patients (40.5%). Ultralow anterior resection was performed in the remaining 22 patients. Laparoscopic abdominal approach was performed in 34 patients (91.9%), conversion rate of 11.8%, and open abdominal approach in 3 patients. Two significant intraoperative events were reported: prostatic bleeding, and urethral injury. All patients had diverting loop ileostomy. Median operative time was 270 minutes. Major complications defined as Clavien Dindo III-IV were found in 9 patients (24.3%). Five reoperations for: 2 anastomotic dehiscence, 2 partial necrosis of descended colon, 1 late anastomotic stricture. We had no mortality in this group. Median hospital stay was 6 days. To date, 75.7% underwent reversal of their loop ileostomy.

**Conclusions/Discussion:** Transanal approach gives better vision of surgical planes. However, in our series it has not proven better surgical outcomes than conventional abdominal approach. Nonetheless, most morbidity cannot be entirely attributed to the TaTME, only urethral injury seems specific for TaTME.

## IS RADICAL RESECTION NECESSARY FOR LARGE NEUROENDOCRINE TUMORS OF THE RECTUM? RESULTS FROM THE NATIONAL CANCER DATABASE.

P203

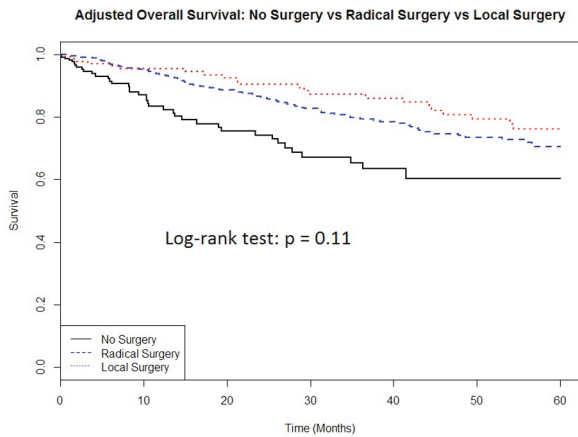
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**Purpose/Background:** Large (> 2-cm) neuroendocrine tumors of the rectum are rare, but associated with decreased overall survival. The National Cancer Care Network recommends radical surgery (low anterior or abdominoperineal resection) for non-metastatic > 2-cm rectal neuroendocrine tumors. Evidence supporting radical surgery in patients with these tumors is limited. This study aimed to compare overall survival between patients receiving no surgery, local surgery (endoscopic, transanal excision, or tissue destruction), or radical surgery for non-metastatic large rectal neuroendocrine tumors.

**Methods/Interventions:** The National Cancer Database was used to identify patients between 2004 and 2013 with the histologic diagnosis of non-metastatic rectal neuroendocrine tumors > 2-cm. Kaplan-Meier estimates of overall survival for patients who underwent no surgery, local surgery, and radical surgery were compared by a log-rank test. Significant covariates were identified and adjusted for in a multivariate Cox proportional hazards model.

**Results/Outcome(s):** A total of 549 patients were identified. No surgery, local surgery, and radical surgery were performed on 95, 214, and 240 patients, respectively. The difference in adjusted overall survival between all three intervention groups was not statistically significant ( $p = 0.11$ ). The multivariate Cox proportional hazards model adjusted for age, sex, race, insurance status, Charlson-Deyo score, tumor size, tumor depth, tumor grade, tumor location (rectum or rectosigmoid), pathologic nodal status, and systemic treatment. Independent predictors of survival in the cohort were partial thickness tumor depth as with T2 lesions (HR 0.32; CI 0.18–0.57;  $p < 0.001$ ) and T3 lesions (HR 0.47; CI 0.29–0.72;  $p = 0.002$ ), low and intermediate grade tumors (HR 0.19; CI 0.12–0.32;  $p < 0.001$ ), and age < 70 (HR 0.48; CI 0.33–0.71;  $p < 0.001$ ).

**Conclusions/Discussion:** The data suggest that radical surgery has no survival advantage compared to local surgery or no surgery in the management of non-metastatic large rectal neuroendocrine tumors. Nodal status is also likely to have significant effect on survival, but missing data about nodal status in the no surgery and local surgery groups made conclusions based on nodes difficult to determine. There appears to be a role for local surgery or non-operative management in this population. More investigation is needed to identify subsets of patients with non-metastatic large rectal neuroendocrine tumors that can be managed with local surgery or non-operative management.



### A CADAVER TRAINING MODEL FOR D3 EXTENDED MESENTERECTOMY IN RIGHT COLECTOMY FOR COLON CANCER.

P204

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**Purpose/Background:** The aim of this study was to evaluate a cadaveric model for simulation training in right colectomy with D3 extended mesenterectomy (D3EM) for right colon cancer in terms of proficiency based progression.

**Methods/Interventions:** Each participant performed D3EM on two cadavers. Proficiency based progression defined by Gallagher, *Ulster Medical Journal* 2012, was recorded for the following content-valid outcome metrics: 1) vessel loop placement on terminal ileal venous trunk 2) vessel loop placement on superior mesenteric artery (SMA) 3) Ileocolic artery (ICA) ligation 4) vessel loop placement on middle colic artery (MCA) 5) MCA right branch division 6) anterior lymph node layer mobilization, 7) Inferior mesenteric vein (IMV) ligation, and 8) posterior lymph node layer mobilization. Following completion of D3EM, the SMV and SMA were cannulated by independent observers to evaluate vascular tears. The specimens were analyzed by a blinded pathologist for lymph node harvest. The Friedman test was used to evaluate the difference between the participants' first and second D3EM. A post-hoc test was used to calculate the resultant power of the study.

**Results/Outcome(s):** Three participants performed D3EM on six cadavers. The mean procedure time on the cadaver simulations decreased from the first to second D3EM, but the difference was not statistically significant ( $p=0.167$ ). There was a decreased number of vascular tears (2 versus 3) in the SMA or the SMV when comparing the second to the first repetition. A post-hoc test revealed that the study had an overall power of 43.7%. D3EM

specimens yielded up to 7 additional lymph nodes, with an average of 0.21 lymph nodes/cm<sup>3</sup>.

**Conclusions/Discussion:** More than two repetitions with cadaver simulation are required to achieve proficiency with no vessel tears in D3EM in right colectomy for right colon cancer.

### INCIDENTALLY FOUND ILEAL CARCINOIDS: IT'S WORTH A PEEK.

P205

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**Purpose/Background:** The usefulness of ileoscopy as a diagnostic tool for Crohn's disease and chronic diarrhea is established, but the use of ileoscopy as a screening tool has not been routinely implemented. The ileum is a common site for small bowel neuroendocrine tumors. These lesions are often asymptomatic until non-localized stages of the disease process, leading to poor outcomes. The purpose of this study is to see if ileoscopy during screening colonoscopy identifies earlier stage neuroendocrine tumors of the small bowel.

**Methods/Interventions:** A retrospective review of all patients with malignant small bowel neuroendocrine tumors, based on ICD-9 codes, evaluated on diagnosis by a practice group of colon and rectal surgeons over seven years was performed. We compared staging of those tumors found incidentally by intubation of the ileocecal valve on colonoscopy to those found only after symptomatic investigation. Only neuroendocrine tumors of the terminal ileum were included.

**Results/Outcome(s):** Nineteen patients with malignant neuroendocrine tumor of the terminal ileum were identified. Two of these patients were excluded due to lack of sufficient records in our database. Of the remaining 17 there were 11 (65%) that were found incidentally on intubation of the terminal ileum for screening colonoscopy purposes. One of these patients has not yet undergone formal resection and was excluded from further analysis. All 6 patients undergoing colonoscopy for symptoms were found to have stage IIIB or IV disease. The ten asymptomatic patients were also most often identified at stage IIIB. Only two asymptomatic patients were identified before having nodal spread. None of the asymptomatic patients were found to have distant metastatic disease.

**Conclusions/Discussion:** The majority of terminal ileum neuroendocrine tumors in this study were found incidentally but with lymphatic spread. Ileoscopy should be performed to evaluate the terminal ileum for possible neoplasm as part of routine screening colonoscopies as this may identify asymptomatic tumors before distant metastatic spread.



## OUTCOMES OF REDO PROCTECTOMY IN PATIENTS WITH RECTAL CANCER.

P206

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**Purpose/Background:** Following low anterior resection, complications such as anastomotic leakage and stricture may occur in up to 35% of patients. Generally, conservative measures such as percutaneous drainage and endoscopic dilation are used to treat these complications. However, up to 5% of patients require redo proctectomy (RP) which entails takedown of the anastomosis or residual rectum stump with or without redo anastomosis. To date, scant data have specifically focused on the outcome of RP. This study aimed to examine the outcomes of RP.

**Methods/Interventions:** After IRB approval, patients who underwent proctectomy between October 2009 and February 2016 were retrieved from a prospective database. Medical records of patients who underwent RP were reviewed. Data collected included demographics, surgical indication, and perioperative and functional outcomes. Primary endpoints were morbidity using Clavien-Dindo (CD) classification and long-term outcomes. Risk factors associated with failure of reversing a diverting stoma were analyzed using Fisher exact test and chi-square test (Table 1).

**Results/Outcome(s):** 41/764 (5.3%) patients (27 males; mean age 62 years) who underwent RP were included. Indications for RP were chronic pelvic abscess (n=8), prior Hartmann's procedure (n=3), rectovaginal or anastomotic fistula (n=15), anastomotic stricture (n=11), cancer recurrence (n=13) and fecal incontinence (n=3). 17/41 (41.5%) patients underwent abdominoperineal resection and 24/41 (58.5%) redo anastomosis (straight: 16 (66.7%), colonic-J pouch: 8(33.3%) with diverting ileostomy. Mean operative time was 329 min (72-1000,  $\pm$ 148) and blood loss was 547ml (20-4800,  $\pm$ 794). The approach of RP was open in 34 (82.9%) and laparoscopic in 7(17.1%) patients. Overall complications rate was 51.2% (21/41), of which 29.2% (12/41) were  $\geq$ IIIB. The most common complication was pelvic sepsis and wound infection (22%); there was no operative mortality. At a median follow-up of 9 [range: 1-84] months, 8/24 (33.3%) patients who underwent redo anastomosis never had their stoma reversed. Patient demographics such as gender, body mass index, age, history of radiation, and postoperative complications were not associated with stoma reversal failure. 13/16 patients who underwent stoma reversal were available for follow up had an acceptable functional outcome with a median daily bowel frequency of 5; 2 patients had minor incontinence.

**Conclusions/Discussion:** Failed low anterior resection results in a permanent stoma more often than a successful RP. This finding highlights the need to optimize outcomes at the time of initial rectal cancer surgery.

Table 1 Risk factors for failure to reverse diverting stoma

Variables	N(%)	Stoma Reversal	Stoma Reversal Failure	P value (<0.05)
Total	24	16	8	
Age at time of redo				
Range(Median)	53-77(62)			0.507
Sex				
Male	15(62.5)	9	6	0.657
Female	9(37.5)	7	2	
BMI(Median)	22.78-33.64(27.5)			
History of Radiation				1.000
Yes	18(75.0)	12	6	
No	6(25.0)	4	2	
Approach of RP				1.000
Open	21(87.5)	14	7	
Laparoscopic	2(12.5)	2	1	
Type of Redo anastomosis				1.000
Straight	16(66.7)	11	5	
Colonic-J pouch	8(33.3)	5	3	
CD Classification of Complication post first surgery				0.362
Grade I-IIIa	8(33.3)	4	4	
Grade IIIb-V	16(66.7)	12	4	
Indication of redo proctectomy(Yes/Not)				
Chronic pelvic sepsis	4/20	4/12	0/8	0.262
Anastomotic stricture intractable to endoscopy	6/18	4/12	2/6	1.000
Fistula	12/12	9/7	3/5	0.430
Cancer Recurrence	6/18	1/15	5/3	0.007
Post complication(Yes/Not)				
Pelvic sepsis	5/19	4/12	1/7	0.631
Fistula			4	
Wound infection	6/18	3/13	3/5	0.361
Peri-stoma complication	1/23	0/16	1/8	0.360
CD Classification of Complication post RP				0.167
Grade I-IIIa	17	13	4	
Grade IIIa-V	7	3	4	
Intervention times before RP				
$\geq$ 2	6	2	4	0.128
<2	18	14	14	

## NEOADJUVANT THERAPY FOR STAGE II AND III RECTAL CANCER: GUIDELINE CONCORDANCE IS HIGHEST AT SPECIALTY CENTERS.

P207

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**Purpose/Background:** National Comprehensive Cancer Network (NCCN) guidelines recommend neoadjuvant chemoradiation followed by curative resection and post-resection adjuvant chemotherapy for patients with Stage II and III rectal cancer. In spite of this, a substantial proportion of patients do not receive guideline concordant care (GCC). Our aim was to investigate the importance of treatment at a specialized center for patients with stage II and III rectal cancer.

**Methods/Interventions:** The National Cancer Database (NCDB) was queried for patients undergoing curative intent resection for Stage II and III rectal cancer from 2006-2011. In an effort to reduce selection bias on the basis of comorbidity, patients with Charlson-Deyo comorbidity score of 2 or greater were excluded. The primary outcome was receipt of neoadjuvant chemoradiation (nCR). The secondary outcome was overall survival. Univariate comparisons of patient demographic, treatment, and pathologic variables were performed. Multivariable logistic regression was used to identify factors independently associated with therapy receipt. Unadjusted Kaplan-Meier and adjusted Cox Proportional hazards survival analyses were performed.

**Results/Outcome(s):** The query identified 24,845 patients. 19,910 (80.1%) received nCR followed by curative surgery (6,201 of these had GCC) while 4,935 (19.8%) underwent surgery first. Patients receiving nCR more often received therapy at academic/research institutions (37.5 vs. 30.8%). They were also younger (59 vs. 63 years), healthier (83.9 vs. 79.4% with no comorbidities), more often male (62.1 vs. 57.0%), more often privately insured (54.7 vs. 44.6%), and wealthier (38.6 vs 35.4% in highest income stratum – all above  $p < 0.001$ ). Race was not associated with nCR receipt ( $p = 0.914$ ). Multivariable modeling demonstrated therapy at an academic center was the strongest predictor of nCR receipt (HR = 1.51 95% CI 1.35-1.68 – Figure). Median overall survival was longer in patients who received nCR (94.0 vs. 87.4 months for patients not receiving nCR, log rank  $p < 0.001$ ). Lowest median overall survival was in patients who received surgery as monotherapy (69.8 months). After adjustment for demographic, pathologic, and treatment-related factors, receipt of therapy at an Academic/Research center demonstrated persistently reduced mortality hazard (HR 0.83, 95% CI 0.75-0.91).

**Conclusions/Discussion:** In this national study of patients with Stage II and III rectal cancer, despite strong guidelines from the NCCN recommending neoadjuvant chemoradiation followed by curative intent surgery and post-resection adjuvant chemotherapy, only 1 in 4 patients receive this fully guideline concordant care. Patients treated at academic centers are most likely to receive nCR and derive the greatest survival benefit from their treatment. For treatment of Stage II and III rectal cancer, management by specialists in a multidisciplinary fashion leads to highest quality outcomes.

Variable	N	Odds of nCR	OR (95% CI)	p
<b>Age</b>				
Under 65	16709		Reference	
65 and Over	8136		0.62 (0.56, 0.68)	<0.001
<b>Gender</b>				
Male	15175		Reference	
Female	9670		0.82 (0.77, 0.88)	<0.001
<b>Race</b>				
Caucasian	21452		Reference	
African American	1922		0.97 (0.86, 1.10)	0.64
Other	1471		0.96 (0.84, 1.10)	0.57
<b>Charlson_Devo_Score</b>				
0	20530		Reference	
1	4215		0.80 (0.74, 0.87)	<0.001
<b>Insurance_Status</b>				
Not Insured	1227		Reference	
Private Insurance	13101		1.17 (1.01, 1.36)	0.04
Medicaid	1582		1.17 (0.96, 1.42)	0.12
Medicare	8287		1.07 (0.90, 1.26)	0.47
Other Government	344		1.13 (0.83, 1.56)	0.44
Insurance Status Unknown	304		0.78 (0.58, 1.05)	0.10
<b>Facility_Type</b>				
Community Cancer Program	2491		Reference	
Comprehensive Community Cancer Program	13343		1.20 (1.08, 1.33)	<0.001
Academic/Research Program	6975		1.51 (1.35, 1.68)	<0.001
Other specified types of cancer programs	36		0.91 (0.44, 2.07)	0.81
<b>Income</b>				
< \$30,000	3028		Reference	
\$30,000 - \$35,999	4597		1.06 (0.94, 1.18)	0.34
\$36,000 - \$45,999	6850		1.09 (0.98, 1.21)	0.13
\$46,000 +	9438		1.18 (1.06, 1.30)	0.002
Missing	932		1.11 (0.92, 1.34)	0.27

## THE EFFECT OF NEOADJUVANT CHEMORADIOTHERAPY ON BOWEL FUNCTION FOR PATIENTS WITH RECTAL CANCER.

P208

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**Purpose/Background:** Chemoradiotherapy for locoregional control of rectal cancer is known to cause gastrointestinal and mucosal irritation during treatment. However, its subsequent effect on bowel function is less clear. Patients with locally-advanced rectal cancer undergoing neoadjuvant chemoradiotherapy may have altered bowel function at baseline. This study aims to evaluate the effect of neoadjuvant chemoradiation on the change in bowel function from baseline for patients with rectal cancer.

**Methods/Interventions:** Patients who underwent long-course neoadjuvant chemoradiotherapy with locally advanced rectal cancer, resectable metastatic rectal cancer, or early stage rectal cancer with significant medical comorbidity from 2014 to 2016 were included. The COREFO questionnaire was administered prospectively at time of outpatient presentation (baseline) and following completion of neoadjuvant chemoradiotherapy (post-neoadjuvant). The COREFO questionnaire is designed to assess bowel function in five domains (incontinence, frequency, social impact, medication, and stool-related aspects) and total score. Values for domain and total score range from 0 to 100, with a higher score representing greater functional disturbance. Demographic, preoperative stage, and tumor data were collected. Changes in COREFO scores were evaluated with paired t-tests.

**Results/Outcome(s):** Nineteen patients met inclusion criteria. The mean (SD) age was 68 (12) years and 10 (53%) of the patients were men. Preoperative local staging by magnetic resonance or endoscopic ultrasound and systemic staging demonstrated that 3 (15.8%) were stage I, 5 (26.3%) stage II, 10 (52.3%) stage III and 1 (5.3%) stage IV. The mean (SD) tumor location from the anal verge was 5 (3) cm. The median (IQR) time between baseline and post-neoadjuvant questionnaire completion was 116 (98-183) days, and the median (IQR) time between completion of neoadjuvant therapy and administration of the second COREFO survey was 45 (31-139) days. There was no difference in mean total COREFO score from baseline to post-neoadjuvant (Baseline: 23 (18), Post-neoadjuvant: 24 (16),  $p = 0.86$ ). Similarly, no difference was found in any domain score (Table 1).

**Conclusions/Discussion:** Patients with rectal cancer who undergo neoadjuvant chemoradiotherapy should not expect a significant change in their bowel function immediately following therapy from baseline.

Characteristics			P-value
<b>Patients, N</b>	19		
<b>Age, Mean (SD)</b>	68 (12)		
<b>Men, N (%)</b>	10 (53)		
<b>Tumor Location, cm (SD)</b>	5 (3)		
<b>AJCC Stage, N (%)</b>			
I	3 (16)		
II	5 (26)		
III	10 (53)		
IV	1 (5)		
	<b>Baseline Function</b>	<b>Post-Neoadjuvant Function</b>	
<b>COREFO Score, Mean ± SD</b>			
Incontinence	21 (17)	23 (18)	0.68
Social Impact	25 (25)	25 (24)	0.97
Frequency	23 (17)	19 (9)	0.36
Stool-Related Aspects	21 (25)	16 (18)	0.49
Need for Medication	12 (18)	18 (23)	0.25
Total COREFO	23 (18)	24 (16)	0.86

**Table 1:** Characteristics of patient demographics. Paired t-test statistics utilized to assess for any difference in the mean COREFO scores.

## MICROSATELLITE INSTABILITY STATUS IN PATIENTS WITH YOUNG-ONSET COLORECTAL CANCER: DOES IT HAVE CLINICAL SIGNIFICANCE?

P209

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**Purpose/Background:** Colorectal cancer (CRC) incidence in young patients is increasing. Young-onset CRC patients have higher rates of microsatellite unstable tumors compared to older patients. Few studies have compared young-onset patients with microsatellite unstable (MSI-H) to microsatellite stable (MSS) tumors to look for clinically significant differences, therefore, we aimed to determine if disparities exist between these two patient populations.

**Methods/Interventions:** A retrospective review was done of all patients with young-onset CRC ( $\leq$ age 50) who underwent surgery at our institution between 1999 and 2010. Demographics, clinicopathologic features, treatment and oncologic outcomes were reviewed and compared in patients with MSI-H versus MSS tumors.

**Results/Outcome(s):** 437 patients met inclusion criteria. Of these, 300 were tested for microsatellite instability (MSI). 45 patients were MSI-H and 255 were MSS. There were no differences in age or gender. Comparisons between both groups are summarized in Table 1. The majority of tumors were located in the right colon (56%) in MSI-H group and in the rectum (62%) in MSS group. A positive family history for CRC was higher in the MSI-H

**P209 Table 1**

Groups		MSI H N=45	MSS N=255	p value
Male (%)			57	NS
Age (years)			42	
Family History (%)		53	25	0.002*
Stage (%)	1	24	20	0.01*
	2	46	25	
	3	11	22	
	4	18	33	
Mutation-positive Lynch Syndrome (%)		52	N/A	N/A
Adjuvant Chemoradiotherapy (%)		27	56	0.001*
Location (%)	Right	56	12	0.001*
	Rectum	22	62	0.001*
	Others	22	25	NS
Procedure (%)	Colectomy	60	24	0.001*
	LAR	9	46	0.001*
	Others	31	30	NS
Recurrence (%)	Local	2	0	NS
	Distal	21	11	<0.05
Survival rate (%)		85	81	NS
Follow up (median(Q1, Q2)) months		47	54	

group. Mutation-positive Lynch Syndrome was found in 52% of patients in MSI-H group. The most common surgery performed was segmental colectomy (60%) in the MSI-H group and LAR (46%) in MSS patients. Both distant and local recurrence rates were higher in the MSS group compared to the MSH group. At last follow up, no metachronous tumors were found in either group.

**Conclusions/Discussion:** Significant clinical differences exist in young-onset CRC patients depending on their MSI status. Obtaining MSI status ahead of surgical intervention may assist in the clinical decision-making process in these patients.

### TRANSANAL TOTAL MESORECTAL EXCISION (TATME): LONG-TERM ONCOLOGICAL AND FUNCTIONAL OUTCOMES.

P210

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**Purpose/Background:** Since transanal approach gives better vision for surgical planes, in theory, better mesorectal quality and nerve preservation could be achieved. If this leads to better oncological and functional outcomes has not been established. We present our case series at a University Hospital.

**Methods/Interventions:** TaTME was introduced in 2012 at our institution. Since then, patients were prospectively enrolled in a database. We included patients with rectal at < 10 cm from anal verge, eligibility criteria for TaTME was at least one of the following: narrow pelvis, obese patients, and intraoperative decision. Preoperative study included colonoscopy, rigid rectoscopy, pelvic MRI and Chest/Abdomen/Pelvis CT in all patients. When considered necessary, abdomen MRI, endorectal/endoanal ultrasound, or PET-CT were performed for selected cases. Patients with cT3-4 or cN+ received neoadjuvant chemoradiation. Demographic and clinical data was obtained. TaTME was performed as part of an hybrid procedure, with an abdominal and transanal approach. Surgical and histopathological data was collected. Standard oncological follow-up for all patients was done. Functional outcome was evaluated with Low Anterior Resection Syndrome (LARS) score survey, we only included patients with >12 months after ileostomy closure.

**Results/Outcome(s):** A total of 37 patients were prospectively included for this study. Male to female ratio was 4.3:1 and mean age was  $56,9 \pm 13,3$  years old. Mean distance from anal verge was 4.6 cm (range 1-10 cm). All patients, except one, received neoadjuvant therapy. Intersphincteric resection with coloanal anastomosis was performed in 15 patients (40.5%), none received partial external sphincter resection. Ultralow anterior resection was performed in the remaining 22 patients. Median lymph

node harvest was 12 (range 1 to 38). Only 1 patients had positive circumferential margin. Distal margin was <1 cm in 10 patients (33.3%). Seven patients had complete pathological response. Anatomopathological staging was 18.9%, 29.7%, 18.9%, 21.6% and 10.8% for Stage 0, I, II, III and IV, respectively. Four year overall survival (OS) was 81.2%. Recurrence was found in 4 patients (10.8%), but only 1 local recurrence (in the rectovaginal septum). Of 19 eligible patients, 14 (73.7%) answered the LARS score questionnaire. Mean follow-up was  $18.6 \pm 8.9$  months. Only 1 patient had no LARS, 2 had minor LARS, and 11 (57.9%) had major LARS. Mean LARS score was  $32.6 \pm 6.6$  pts.

**Conclusions/Discussion:** We find adequate oncological outcomes in our series. Functional outcomes after surgery in low rectal cancer are usually unsatisfactory. High prevalence of low anterior resection syndrome was found in our series, most of them with severe LARS.

### SEGMENTAL VERSUS TOTAL COLECTOMY IN YOUNG PATIENTS WITH MICROSATELLITE UNSTABLE COLON CANCERS: DOES OPERATIVE APPROACH IMPACT ONCOLOGIC OUTCOMES?

P211

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**Purpose/Background:** Colon cancer incidence in young patients is increasing. Young-onset colon cancer patients have higher rates of microsatellite unstable (MSI-H) tumors compared to older patients. Few studies have compared differences in recurrence and survival when young-onset patients with MSI-H colon cancer undergo segmental versus total colectomy. We aimed to determine if differences in outcomes exist between these two cohorts based on surgical approach.

**Methods/Interventions:** A retrospective review was done of all patients with young-onset ( $\leq$  age 50) MSI-H colon cancer who underwent a curative-intent resection at our institution from 1999-2010. Demographics, clinicopathologic features and oncologic outcomes were reviewed and compared based on surgical management.

**Results/Outcome(s):** 33 patients were identified. Total colectomy (TC) was performed in 23 (69%), segmental colectomy (SC) in 10 (31%) patients. Median age was 43 years (range, 19-50). The majority of tumors were in the right colon (67%). A family history of colon cancer was higher in the TC group. Comparisons between both groups are summarized in Table 1. Mutation-positive Lynch Syndrome was found in 56% in the TC group vs. 30% in the SC group. No patients in either group were found to have metachronous tumors or local recurrence. Distant recurrence was lower in the TC group compared to the SC group. Survival was higher in patients undergoing TC

compared to those having a SC over a median (Q1, Q2) follow up of 30 (18, 79) months.

**Conclusions/Discussion:** Total colectomy was associated with less distant recurrence and better survival than segmental colectomy in patients with young-onset MSI colon cancer.

### PROCTOCOLECTOMY VERSUS PROCTECTOMY ALONE IN YOUNG PATIENTS WITH MICROSATELLITE UNSTABLE RECTAL CANCERS: DOES OPERATIVE APPROACH IMPACT ONCOLOGIC OUTCOMES?

P212

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**Purpose/Background:** Rectal cancer incidence in young patients is increasing. Young-onset rectal cancer patients have higher rates of microsatellite unstable (MSI-H) tumors compared to older patients. Few studies have compared differences in recurrence and survival when young-onset patients with MSI-H rectal cancer undergo proctectomy alone versus proctocolectomy. We aimed to determine if differences in oncologic outcomes exist between these two cohorts based on surgical approach.

**Methods/Interventions:** A retrospective review was done of all patients with young-onset (age 50) MSI-H rectal cancer who underwent curative intent surgery at our institution between 1999 and 2010. Demographics, clinicopathologic features and oncologic outcomes were reviewed and compared based on surgical management.

**Results/Outcome(s):** 10 patients were identified. Comparisons between both groups are summarized in Table 1. Mutation-positive Lynch Syndrome was found in 75% in the proctocolectomy group vs. 34% in the

proctectomy alone group. Both distant and local recurrence rates were higher in the proctectomy alone group compared to the proctocolectomy group. Survival was 100% in patients undergoing proctocolectomy compared to 83% in those having a proctectomy alone over a median (Q1, Q2) follow up of 32 (18, 50) months.

**Conclusions/Discussion:** A trend toward less recurrence and a better survival was seen in patients with young-onset MSI-H rectal cancer undergoing proctocolectomy compared to proctectomy alone.

### CUTTING SETON: AN EFFECTIVE AND SAFE TECHNIQUE FOR MANAGEMENT OF COMPLEX ANAL FISTULAS.

P213

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**Purpose/Background:** Cutting seton is one of many techniques used to resolve anal fistulas and is believed by many surgeons to result in sphincter muscle injury, potentially resulting in complications like fecal incontinence (FI). The aim of our study was to review the long-term outcomes and patient satisfaction in a series of patients with anal fistulas treated with cutting setons.

**Methods/Interventions:** We conducted a retrospective study with review of prospective data from completed surveys of patients with anal fistulas treated by cutting setons from 1994 to 2016 by a single colorectal surgeon. Patients without complete data or surveys were excluded. Demographic, operative, and long-term outcomes were analyzed.

**Results/Outcome(s):** Our database comprised thirty two patients, of which twenty five (78.1%) were male,

P211 Table 1

Groups		Total Colectomy N=23	Segmental Resection N=10	p value
Male (%)			51	NS
Age (years)			43	
Right colon cancer			67	
Family History (%)		60	20	0.02*
Stage (%)	1	30	0	0.02*
	2	30	50	
	3	30	20	
	4	10	30	
Mutation-positive Lynch Syndrome (%)		56	30	0.05
Adjuvant chemoradiotherapy (#patients)		1	1	NS
Recurrence (%)	Local		0	NS
	Distant	4	30	0.01*
Survival rate (%)		96	70	0.04*
Follow up (median (Q1, Q3)) months		30 (18, 79) months		NS

with mean age and BMI at surgery of  $48.0 \pm 12.0$  years and  $29.8 \pm 6.2$  kg/m<sup>2</sup>, respectively. Eight (25%) were Crohn's patients. Twenty eight (87.5%) were treated for transphincteric fistulas. Seven (21.9%) previously underwent other procedures for fistula treatment. Post surgery, mean follow-up period via survey was  $5.3 \pm 6.1$  years, of which office follow-up was  $3.3 \pm 5.7$  years. On average, setons were removed after  $4.3 \pm 2.2$  months and required  $2.2 \pm 1.1$  tightening sessions. Twenty (62.5%) patients had setons removed in the operating room (the rest fell out). Fifteen (46.9%) patients had partial fistulotomy at time of seton placement and nineteen (59.4%) at seton removal (nine (28.1%) had partial fistulotomy during both procedures). Seven (21.9%) patients (57.1% male) reported mild FI post surgery, with FI scores (Wexner score) ranging from 1 - 8 (on a scale of 0 - 20). Of these, six had risk factors prior to seton placement (Crohn's, FI, other fistula surgeries) and one reported very mild FI symptoms (Wexner score: 1). Five (15.6%) patients reported FI prior to seton placement, four of whom had complete resolution of their symptoms post procedure. Five (15.6%) patients reported fistula recurrence, four of whom had recurrence within six months of the procedure. Of these four, all but one either had a history of Crohn's or other previous fistula repair surgeries. Of the eight (25%) Crohn's patients, one reported FI, one reported fistula recurrence within six months of the procedure and one reported both post surgery. Twenty nice patients (90.6%) reported both short- and long-term satisfaction post procedure.

**Conclusions/Discussion:** Our long-term follow-up data suggests that cutting seton is an effective and permanent treatment technique for complex anal fistulas with very low rates of FI or recurrence, especially in the absence of other pre-existing risk factors. Favorable outcomes and patient satisfaction rationalize greater use of this technique. Good outcomes in our subset of Crohn's patients also support further studies to explore the appropriateness

of this technique with patients suffering from inflammatory bowel disease.

**STAPLED HEMORRHOIDECTOMY AND TRANSANAL HEMORRHOIDAL DEARTERIALIZATION: BOTH ARE SAFE AND EFFECTIVE, BUT IS ONE BETTER?**

P214

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**Purpose/Background:** Treatment for hemorrhoids is one of the most common procedures performed by colorectal surgeons. Per physician preference, multiple techniques are available for the treatment of grade 2 and 3 hemorrhoids. The aim of this study was to compare the outcomes of Stapled Hemorrhoidectomy (SH) to those of Transanal Hemorrhoidal Dearterialization with Mucopexy (THDm) in a large series.

**Methods/Interventions:** A retrospective review (2011 - 2015) of our database identified 304 patients who underwent SH or THDm for hemorrhoid treatment at a single institution with 7 colorectal surgeons. The procedure of choice was a function of surgeon preference. Demographic, peri-operative and outcomes were assessed. Patients without complete demographic or peri-operative data were excluded from the study. Patients were categorized in two groups based on the procedure type. Statistical tests (T-test, Chi-square test and Fisher's Exact test) at the 5% significance level were used to assess statistical significance of differences between the two patient groups.

**Results/Outcome(s):** The study included 256 patients (54.3% male), of whom 141 (55.1%) underwent THDm and 115 (39.8%) underwent SH. THDm patients were on average older ( $57.5 \pm 13.7$  years) at surgery than SH

P212 Table 1

Groups		Proctocolectomy N=4	Proctectomy alone N=6	p value
Male (%)			80	NS
Age (years)			43	
Family History (%)		50	84	0.1
Stage (%)	1	25	17	0.1
	2	25	50	
	3	25	17	
	4	25	16	
Mutation-positive Lynch Syndrome (%)		75	34	0.1
Adjuvant chemoradiotherapy (%)		75	50	0.4
Recurrence (%)	Local	0	17	0.01*
	Distant	0	17	
Survival rate (%)		100	83	0.2
Follow up (median (Q1, Q3)) months			32 (18, 50)	NS

patients ( $49.7 \pm 12.3$  years), with a p-value  $< 0.0001$ . Mean BMI of patients at surgery was  $27.7 \pm 5.1$  kg/m<sup>2</sup> and was statistically similar for both groups. THDm and SH mean operating times were similar at  $30.6 \pm 13.3$  minutes and  $34.0 \pm 18.6$  minutes, respectively (p-value: 0.11). THDm patients experienced lower complication rate compared to SH patients (THDm: 14 (9.9%), SH: 27 (23.5%); p-value: 0.003). Bleeding was the most common complication among THDm patients; common SH complications included urinary retention, bleeding, incontinence and protrusion. THDm patients experienced a 7.8% failure rate vs. 3.5% for SH patients, but the difference in rates is statistically insignificant. Patients with failed THDm procedures underwent either banding, repeat THD or hemorrhoidectomy; patients with failed SH underwent hemorrhoidectomies or repeat SH. Hemorrhoidectomy was most common repeat procedure for both groups. The mean follow-up time for THDm and SH patients was also statistically similar at  $5.5 \pm 8.9$  months and  $7.3 \pm 10.7$  months, respectively (p-value: 0.16).

**Conclusions/Discussion:** Given similar operative times and failure rates, we believe both THDm and SH are safe and effective procedures for hemorrhoid resolution. That said, our findings also support THDm as the procedure of choice due to its lower rate and fewer types of complications.

#### IMPROVED OUTCOMES FOR TREATMENT OF RECTOURETHRAL FISTULA WHEN PERFORMED BY A SPECIALIZED MULTIDISCIPLINARY TEAM: A SINGLE CENTER EXPERIENCE.

P215

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**Purpose/Background:** Rectourethral fistula (RUF) is a rare, challenging problem encountered by colorectal surgeons. Primary and salvage treatment of prostate cancer via instrumentation and/or radiation therapies is largely responsible for the increased rate and complexity of RUF

over the past several decades. Changes to surrounding normal tissue architecture, including radiation-induced fibrosis, proctitis, and vasculitis make RUF repair particularly challenging, and elevate risk for treatment failure. We hypothesize that improved surgical outcomes for RUF may be seen when performed by an experienced colorectal surgeon as part of a multidisciplinary surgical team.

**Methods/Interventions:** The local electronic medical records system was searched for patients treated by the senior author between the years 2000-2016 with ICD or CPT codes matching RUF or repair respectively. Records were reviewed for categorical variables, etiology, symptoms, operative details, and disease recurrence, which was defined as either return of symptoms or visualization by imaging or direct physical exam.

**Results/Outcome(s):** Twenty-five patients met screening parameters, but 5 were excluded after review for incorrectly documented diagnoses (n=3) or RUF that was treated non-operatively (n=2), leaving n=20 patients for analysis. Of those included, all were males, with an average age of 69 at time of operation, who were previously treated in some fashion (surgery +/- radiation therapy) for prostate cancer. The most common presenting symptoms included passing urine from rectum (n=15, 75%), followed by pneumaturia/fecaluria, dysuria or recurrent UTI, or bleeding. Surgical techniques ranged to include: primary closure alone, fibrin glue, rectal advancement flap, York-Mason, low anterior resection with or without urinary and/or fecal diversion, and transperineal repair. All operations were performed as part of a multidisciplinary surgical team comprised of the senior author colorectal surgeon and a urologist with or without a plastic surgeon, depending if tissue flap closure was employed. The overall recurrence rate was 7/20 (35%) and of these, 5/7 recurrences occurred in patients who had undergone an unsuccessful repair at an outside hospital prior to referral.

**Conclusions/Discussion:** RUF represent a complex surgical problem for colorectal surgeons with historically high rates of surgical treatment failure due to technical difficulty and disrupted tissue viability from radiotherapy or chronic inflammation. These facts make it difficult to establish standards of care for colorectal surgeons treating

**P214 Demographic and Outcomes Data**

	All Patients	THDm Patients	SH Patients	p-value @ 95% significance level
# patients	256	141	115	
# Male (%)	139 (54.3%)	81 (57.4%)	58 (50.4%)	
Mean age (years)	54.0 ± 13.6	57.5 ± 13.7	49.7 ± 12.3	<0.0001
Mean BMI (kg/m <sup>2</sup> )	27.7 ± 5.1	27.7 ± 4.9	27.8 ± 5.3	0.87
Mean operating time (min)	32.1 ± 15.9	30.6 ± 13.3	34.0 ± 18.6	0.11
# Complications (%)	41 (16.0%)	14 (9.9%)	27 (23.5%)	0.003
# Failures (%)	15 (5.9%)	11 (7.8%)	4 (3.5%)	0.18
Mean follow-up period (months)	6.3 ± 9.7	5.5 ± 8.9	7.3 ± 10.7	0.16

RUF at large. Our data shows that only 2/15 (13%) of patients presenting for initial RUF treatment suffered recurrence, whereas 5/7 (71%) of those with prior repair attempts recurred. This stark difference suggests that initial surgical RUF repair should be performed by an experienced multidisciplinary surgical team at a referral center.

#### A NEW INSIGHT OF THE PREOPERATIVE ASSESSMENT OF SIMPLE CRYPTOGLANDULAR FISTULA-IN-ANO.

P216

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**Purpose/Background:** Management of cryptoglandular fistula-in-ano remains challenging. Although different surgical techniques have been described over the past decades, fistulotomy remains the most effective treatment for simple anal fistula. Key is identifying these simple fistulae. MRI is the golden standard for pre-operative assessment. Suggestions have been made that the distance from the external opening to the anal verge could predict the complexity of a fistula and therefore possibility predicting the need for an expensive MRI. This is however supported by little evidence. Aim of this study is to evaluate if the external opening distance from the anal verge can predict the complexity of a fistula proven on a pre-operative MRI and if this can be of influence for the operative treatment.

**Methods/Interventions:** All patients undergoing surgery for cryptoglandular fistula-in-ano between January 2014 and December 2015 have been studied retrospectively. MRIs were reviewed by a radiologist and a senior colorectal resident and the fistula were classified as simple or complex. Simple fistulae were defined as intersphincteric or low transsphincteric fistulae. All the other fistulae were defined as complex. The distance between the external opening and anal verge was measured pre-operatively and was divided in the categories  $\leq 1$ cm,  $\leq 2$ cm, or more than 2cm distance from the anal verge. The correlation between the distance from anal verge and complexity of the fistula was tested.

**Results/Outcome(s):** A total of 73 patients were included, 48 men and 25 women. We could identify 28 simple and 45 complex fistulae with MRI. Complex fistula was significantly more frequent if the distance was  $>2$ cm compared to the groups  $\leq 1$ cm and  $\leq 2$ cm. (73,3% vs 6,7 and 26,7%,  $p < 0.001$ ). If the distance was  $\leq 1$ cm it was significant more frequent in simple fistula (83,3% vs 16,7%). 92,9% ( $n=26$  of 28) of the simple fistula were successfully treated with fistulotomy, compared to 2,2% ( $n=1$  of 45) of the complex fistula.

**Conclusions/Discussion:** Our data confirms the hypothesis that the distance of the external opening in peri-anal fistula to the anal verge is correlated to the

complexity of the fistula. This can be of influence in the need for pre-operative imaging and for the choice of operative treatment. The added value of pre-operative MRI for fistula with a distance of  $\leq 1$  cm from the anal verge is low. These fistulae can be treated with simple fistulotomy.

#### SKIN CLOSURE AFTER STOMA REVERSAL: A PROTOCOL-BASED APPROACH.

P217

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**Purpose/Background:** Stoma closure is associated with significant peri-operative morbidity. Given the high rate of infection following stoma site skin closure, conventional practice is to leave skin open for healing with secondary infection. However, the resultant open wound is associated with increased morbidity and cost. Consequently, several investigators have attempted to minimize infection with description of innovative skin closure techniques. Out of these, purse-string closure of skin has been reported to be associated with least incidence of wound infection, about 3%. However, this technique can result in unsightly scar, which has prevented its widespread utilization. On the other hand, primary suture closure of stoma site results in acceptable cosmesis however has been reported to carry infection rate as high as 30%. We describe a novel approach where selective linear skin closure is performed based on a defined protocol.

**Methods/Interventions:** The protocol involves measurement of subcutaneous tissue thickness described as the distance between fascia and skin surface. Linear closure of skin is performed using interrupted, horizontal mattress 2-0 Nylon sutures if the thickness of subcutaneous tissue is measured to be less than 4 cm. For patients with subcutaneous tissue  $>4$ cm, skin is left open for healing with secondary intention. This protocol was implemented four years ago however at the time of this submission records between July 2014 and October 2016 were available for review. Chart review will be completed to include all patients treated with this protocol and complete data will be presented.

**Results/Outcome(s):** Results: Review of available records identified 65 patients (Colostomy=11, Ileostomy=54) that underwent stoma closure under this protocol. Out of these, 38 patients met the criteria for skin closure; remaining patients had their wounds left open for healing with secondary intention. A total of 3 (7.89%) wound infections were identified in the closure group. Remaining 35 patients experienced complete wound healing without any complications and excellent cosmetic outcomes.

**Conclusions/Discussion:** Our results indicate that selective closure of stoma site per described protocol results in a much lower rate of wound infection compared to reported



rate for conventional primary closure while retaining the benefit of superior cosmetic results. Furthermore, this protocol can be applied to both ileostomy and colostomy closure sites.

### IMPACT OF ENDOSCOPIC EVALUATION PRIOR TO COLOSTOMY REVERSAL AFTER HARTMANN PROCEDURE.

P218

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**Purpose/Background:** Diverticulosis is a common and increasing health problem in industrialized countries. Approximately 10-20% of patients with diverticulosis develop diverticulitis and approximately 1% require immediate surgical intervention by creation of a Hartmann's colostomy (HC). Prior to reversal of a colostomy, the American Society of Colon and Rectal Surgeons recommends follow-up colonic evaluation for all cases of acute diverticulitis. This evaluation may be done with either colonoscopy or barium enema and flexible sigmoidoscopy. The purpose of this study was to evaluate the impact of preop evaluation in patients presenting for Hartmann's reversal in terms of change in operative plan.

**Methods/Interventions:** A retrospective chart review was completed on patients at our institution who had undergone Hartmann's colostomy between 2009-2013 and who also underwent evaluation 180 days prior to reversal. The following factors in presentation and preoperative evaluation were considered: patient characteristics, clinical signs on presentation, type of preoperative evaluation prior to ostomy reversal, findings on preoperative evaluation and change in operative plan secondary to pre-op evaluation.

**Results/Outcome(s):** 52.2% of 159 patients who underwent a HC were subsequently reversed at the same hospital. The largest factor in clinical decision for a HC was peritoneal signs on presentation (48% of patients). Of the patients who underwent HC, 81.9% had preoperative endoscopy prior to reversal of the stoma, while 18.1% had a barium enema as their preoperative evaluation. Of the patients who had preoperative evaluation with a colonoscopy, 14.7% had a change in management decision due to a newly diagnosed cancer (1/10), more proximal extensive diverticular disease (7/10), and retained sigmoid colon (3/10).

**Conclusions/Discussion:** Although not statistically significant, endoscopy had a role in the change of plans in select patients. In the 14.7% of patients who had undergone change in management secondary to endoscopy, the most common findings were more extensive diverticular disease, a missed cancer, and retained sigmoid. Interestingly, all patients who had undergone barium enema as part of their preoperative evaluation were

operated on by non-colorectal surgeons. This study helps to highlight the importance of ASCRS recommendation of endoscopy prior to reversal of a Hartmann's pouch due to the significant percentage of clinical changes made based on the result.

### RIGHT-SIDED DIVERTICULITIS IN A CANADIAN TERTIARY-CARE CENTER: A 15-YEAR EXPERIENCE.

P219

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**Purpose/Background:** Most literature on right-sided colonic diverticulitis comes from Asia, as it is far more common amongst Asian patients, and represents less than 5% of all diverticulitis cases in North America. The purpose of this study is to describe the presentation, management, and long-term outcomes of patients with a first episode of right-sided diverticulitis in a North American tertiary care center.

**Methods/Interventions:** All patients who presented to a large tertiary academic center with right-sided diverticulitis from 01/2000–08/2015 were identified. A retrospective chart review was performed, and patient demographics, disease characteristics, and management strategies were collected. A prospective telephone follow-up was performed to gather long-term outcomes.

**Results/Outcome(s):** Sixty-three patients with a median age of 52.1 (23.4–93.1) years presented to hospital with a first episode of right-sided diverticulitis with a median follow-up of 1,683.5 (1–6,084) days. Three patients (4.7%) were excluded as they were subsequently diagnosed with right-sided colon cancer. Twenty-five (41.7%) patients were male, and 10 patients (16.7%) were Asian. Fifty-eight patients (96.7%) were admitted to hospital. The majority of patients had uncomplicated disease (88.3%), whereas 7 (11.7%) presented with complicated diverticulitis, including 3 abscesses (5.0%) and 4 free perforations (6.7%). Most cases were diagnosed by CT scan (75.0%); a minority were diagnosed intra-operatively (20.0%) or by post-operative pathology (5.0%). Of the 45 cases diagnosed by CT, all were managed conservatively with antibiotic therapy with a median hospital stay of 5 (1–14) days. Of these, 2 had persistent disease requiring re-admission and antibiotics, and another 2 had recurrent disease treated conservatively (time to recurrence of 210 and 1,430 days). Of the fifteen patients (25.0%) managed operatively, 10 were for suspected appendicitis, 2 for suspected colon mass, 2 for acute abdomen, and 1 for failure of percutaneous drainage of an abscess. Most of these patients underwent a right hemicolectomy (53.3%) or ileocecectomy (40.0%), while 1 patient (6.7%) had an appendectomy and diverticulectomy. Median hospital stay

was 9 (5–16) days for patients who underwent an ileocectomy and 13 (6–36) days for patients who underwent a right hemicolectomy. Only one patient suffered a surgical post-operative complication following a right hemicolectomy (enterocutaneous fistula).

**Conclusions/Discussion:** When diagnosed by CT scan, right-sided diverticulitis can be successfully managed conservatively in most cases. Long-term expectant management appears to be successful with low rates of recurrence and complications. In a North American population where this condition is more seldom observed, it is prudent to consider an underlying colon cancer.

#### LONG-TERM OUTCOMES AFTER SUCCESSFUL CONSERVATIVE TREATMENTS BETWEEN ACUTE NONPERFORATED (HINCHEY 0 AND IA) VERSUS PERFORATED (HINCHEY IB AND II) SIGMOID DIVERTICULITIS PATIENTS.

P221

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**Purpose/Background:** Long-term outcomes after successful conservative treatments in acute sigmoid diverticulitis patients are limited and still controversy. This study aims to compare long-term outcomes between acute non-perforated and perforated sigmoid diverticulitis patients who underwent successful conservative treatments.

**Methods/Interventions:** A retrospective cohort study was performed in acute sigmoid diverticulitis patients who underwent successful conservative treatment with either antibiotics alone or with additional percutaneous drainage in Siriraj hospital between January 1999 and December 2015. Comparison between non-perforated (modified Hinchey 0 and IA) versus perforated (modified Hinchey IB and II) patients were achieved including demographic data, short-term outcomes and recurrence rate.

**Results/Outcome(s):** Total 107 patients who diagnosed of acute sigmoid diverticulitis with successful conservative

treatment were retrieved; 79 non-perforated and 28 perforated. With a median follow up time of 37 months, there were no difference in age, gender, mortality, recurrence rate and surgery after index admission between two groups. Perforated group (modified Hinchey IB and II) had longer hospital stay ( $p = 0.036$ ) and need more additional percutaneous drainage ( $p < 0.001$ ). [See Table]

**Conclusions/Discussion:** Acute perforated sigmoid diverticulitis (modified Hinchey IB and II) patients can be initially treated with antibiotics and percutaneous drainage with acceptable and comparable long-term outcomes to acute non-perforated (modified Hinchey 0 and IA) patients.

#### COMPLETENESS OF SURVEILLANCE AFTER RESECTION FOR STAGE II/III COLORECTAL CANCER: A RETROSPECTIVE REVIEW.

P222

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**Purpose/Background:** Colorectal cancer (CRC) is the third most common cancer in North America. Five year overall survival (OS) rates for stage II and III cancer are 70% and 55% respectively. Following resection, patients remain at risk for recurrence. Guidelines exist for the recommended surveillance of patients following surgical resection, with the aim of detecting recurrences earlier, thereby reducing mortality. More intense surveillance has been shown to reduce mortality. However, it has also been shown that adherence to the recommended surveillance is low. We aim to determine the proportion of patients at our center with resected stage II and III CRC who undergo complete surveillance at eighteen months.

**Methods/Interventions:** This study is a retrospective review of patients who underwent surgical resection for stage II and III CRC between January 1, 2014 and December 31, 2014 at a single academic tertiary hospital. Following resection, patients who had at least one CEA test, one colonoscopy and one CT scan of the chest,

#### P221 Demographic data and outcomes between Non-perforated (Hinchey 0 and IA) versus Perforated (Hinchey IB and II) acute sigmoid diverticulitis patients

	Non-perforated (N=79)	Perforated (N=28)	p-value
Mean age $\pm$ SD	67.2 $\pm$ 14.9	62.1 $\pm$ 14.3	0.118
Male gender	26 (32.9%)	13 (46.4%)	0.2
Median length of hospital stay [IQR]	5 [4,7]	7 [4,10]	0.036*
Percutaneous drainage	0 (0%)	7 (25%)	< 0.001*
Diverticulitis-related mortality	1(1.3%)	1 (3.6%)	0.468
Median follow-up time [IQR]	40 [11,101]	29 [3.25, 83]	0.206
Recurrence rate	16 (20.3%)	6 (21.4%)	0.895
Surgery after index admission	2(2.5%)	2(7.1%)	0.271

abdomen and pelvis within eighteen months were considered to have complete surveillance.

**Results/Outcome(s):** We identified 76 eligible stage II and III CRC patients that were included in our study. At eighteen months, surveillance rates with CEA, CT scan and colonoscopy were 58%, 71% and 33% respectively. Overall, 22% of patients received the complete recommended surveillance at eighteen months.

**Conclusions/Discussion:** In patients with stage II and III CRC, the recommended surveillance includes CEA testing, colonoscopy and CT scans. We have demonstrated that at a single center, adherence to the recommended surveillance is low. Given that more intense surveillance reduces mortality, it is important that improved rates of complete surveillance are achieved at our center. Other studies have shown that the introduction of measures aimed at increasing adherence to surveillance, such as a patient navigator, is effective. Our study provides evidence that the introduction of such measures should be considered at our center.

#### IMPACT OF SURGICAL APPROACH ON ONCOLOGIC AND LONG-TERM SURVIVAL OUTCOMES IN STAGE I-III COLON CANCER.

P223

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**Purpose/Background:** Robotic approaches are increasingly being used in oncologic operations. While there is short term data suggesting that resections are safe and technically feasible, oncologic and survival outcomes remain uncertain. This study evaluates the impact of surgical approach on oncologic and survival outcomes in partial and total colectomies for colon cancer.

**Methods/Interventions:** The US National Cancer Data Base (2010-2012) was reviewed for patients with stage I-III adenocarcinoma of the colon, who underwent robotic and laparoscopic partial or total colectomies. Univariate and multivariate analyses were performed to compare lymph node retrieval, surgical margins and survival between robotic and laparoscopic approaches on an intention to treat basis. Propensity score matching was then used to create comparable cohorts and Kaplan-Meier survival analyses were performed.

**Results/Outcome(s):** 5 year survival (5YS) was 75.2% for stage I disease, 52.8% for stage II, and 53.9% for stage III disease. Of the 15,112 patients included in this study, 5.1% underwent a robotic approach (N=765, with a conversion rate of 10.5%), and 94.9% underwent a laparoscopic approach (N=14,347 conversion rate of 15.1%). Over the 3 year study period, robotic approaches more than doubled, while laparoscopic approaches increased by 15%. Robotic approaches were associated with a greater proportion of Hispanic patients (11.5% vs. 8.6%,  $p=0.009$ ),

private insurance (37.8% vs. 32.7%,  $p=0.001$ ), and earlier stage disease (stage 1 30.7% vs. 26.4%,  $p=0.028$ ) as compared to laparoscopic. There was no significant difference between number of lymph nodes retrieved (19.8 vs. 20.0,  $p=0.6200$ ), or negative surgical margins (95.7% vs. 95.9%,  $p=0.6700$ ). After controlling for patient, disease and treatment characteristics, robotic approaches were associated with an improved hazard of mortality relative to laparoscopic (HR 0.79,  $p=0.027$ ). Linear regression found no significant difference in lymph node retrieval with robotic approaches (-0.39,  $p=0.285$ ). Logistic regression found no significant difference in rates of positive margins with robotic approaches (OR 1.09,  $p=0.649$ ). Given the discrepancy in sample sizes, propensity score matching was performed to reduce bias between the cohorts. After matching, robotic approaches were associated with significantly improved survival over laparoscopic approaches in stage II (5YS 66.9% vs. 56.8%,  $p=0.0189$ ) and III disease (5YS 78.6% vs. 64.9%,  $p=0.0241$ ).

**Conclusions/Discussion:** Robotic approaches to partial and total colectomies for stage I-III colon cancer offer comparable oncologic outcomes as laparoscopic approaches. Relative to laparoscopic approaches, robotic approaches appear to offer improved long-term survival in this patient population. Further study, characterizing disease recurrence is warranted.

#### A REVIEW OF MORBIDITY AND MORTALITY IN COLON AND HIGH- GRADE APPENDICEAL CANCER PATIENTS WITH CARCINOMATOSIS WHO UNDERWENT CYTOREDUCTIVE SURGERY, HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY, AND LIVER RESECTION FOR HEPATIC METASTASIS.

P224

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**Purpose/Background:** Liver resection and colectomy for colon cancer is considered acceptable treatment for isolated metastasis to the liver. Recent surgical oncologic thinking has expanded aggressive surgical treatment to include liver resection, cytoreductive surgery, and Hyperthermic Intraperitoneal Chemotherapy (HIPEC) for carcinomatosis due to colon cancer and high grade appendiceal cancer. Data has shown appreciable long-term survival and acceptable morbidity and mortality rates in those patient who underwent liver resections. We reviewed the morbidity and mortality, and months to recurrence of patients with colorectal and high grade appendiceal carcinomatosis who underwent CRS, HIPEC, and liver resection.

**Methods/Interventions:** Data was collected prospectively, and analyzed retrospectively from 2005 to 2016. 184 patients underwent cytoreductive surgery (CRS) and

hyperthermic intraperitoneal chemotherapy (HIPEC) for various cancers with carcinomatosis including colorectal, appendiceal, ovarian, mesothelioma, bladder, gastric, and spindle cell sarcoma. 20 patients underwent liver resections in addition to CRS and HIPEC. Data was collected by chart review from electronic medical records.

**Results/Outcome(s):** Patient ages ranged from 35 to 83, and the average was 57. Forty-five percent of patients were male. The average length of stay was 13.7 days. All patients underwent a complete resection, or CC-0. Sixty percent of patients had imaging or biopsy proven recurrence of disease. For those who had a recurrence, the average months until recurrence was 7.7 months. Ninety five percent of patients had colon cancer and carcinomatosis. Ninety percent underwent wedge resection, and 10% underwent wedge resection and lobectomy. The Clavien Dindo Classification score was used to quantify surgical complications based on therapies used to correct a complication. For this study, scores ranged from grade 1- any deviation from normal postoperative course without pharmacological/surgical/endoscopic/ radiological intervention, to V- death. The comprehensive complication index (CCI) is a novel scale which was used to measure surgical morbidity. For this study, CCI scores ranged from 0- no complications, to 100- death. The average score was 28.1.

**Conclusions/Discussion:** Patients who underwent CRS, HIPEC and liver resection for colorectal and high grade appendiceal carcinomatosis had acceptable morbidity and mortality rates, with an average CCI score of 28.1, 1 death recorded during surgical admission, and 60% of patients with recurrent disease at an average of 7.7 months from surgery. The morbidity and mortality associated with CRS, HIPEC, and liver resection for colorectal and high grade appendiceal carcinomatosis is within acceptable rates when compared to those patients who undergo conservative management alone.

#### T<sub>≤</sub>2N0,TRG1-2 IN POST CHEMORADIATION THERAPY MRI: WHAT IT CAN PREDICT?

P225

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**Purpose/Background:** Assess the ability to predict pathologic complete response, absence of lymph node involvement and favorable prognosis of rectal cancer patients considered T<sub>≤</sub>2N0,TRG1-2 in post chemoradiation therapy MRI.

**Methods/Interventions:** A retrospective analyses was performed to identify consecutive patients treated in our institution from May/2012 through November/2015 with stage T3-4N0M0 or T(any)N+M0 located within 10 cm from anal verge, or T2N0 within 7cm from anal verge. Patients were staged and re-staged 8 weeks after

completion of chemoradiation (5-FU, 5040cGy) by digital exam, colonoscopy, pelvic MRI, thorax and abdominal CT scans. Patients with synchronous colorectal cancer or other non-colorectal cancers, stage IV disease, inflammatory bowel disease, familial adenomatous polyposis, recurrent rectal cancer, palliative resections, without MRI exam, not treated by complete long-course chemoradiotherapy, significant delay (>14 weeks) on restaging, and/or significant delay (>6 weeks after restaging) on surgery were excluded. According to restaging MRI, patients with T<sub>≤</sub>2N0,TRG1-2 were compared to non-γT<sub>≤</sub>2N0,TRG1-2 in order to analyze its prognostic factor, prediction of absence of lymph node involvement, and prediction of complete pathologic response.

**Results/Outcome(s):** Out of 409 patients, 275 were eligible for the study. Initial staging was I in 18 (6.5%) patients, II in 58 (21.1%), and III in 199 (72.4%). Restaging MRI identified 59 (21.4%) T<sub>≤</sub>2N0,TRG1-2. Patients were restaged with 8.8 (6.8-13.9) weeks. All patients underwent total mesorectal excision with curative intent. Specimen pathologic evaluation revealed 43 (15.6%) patients with complete pathologic response, 69 (25.1%) with stage I, 75 (27.3%) with stage II, and 88 (32%) with stage III. 23 (39%) of MRI γT<sub>≤</sub>2N0,TRG1-2 patients presented complete pathologic response, and only 7(11.8%) presented lymph node metastasis. In non-γT<sub>≤</sub>2N0,TRG1-2 patients, 20(9.2%) presented complete pathologic response, and 81(37.5%) presented lymph node metastasis. Mean follow-up time was 31.4 months. Overall survival and recurrence rate in the MRI γT<sub>≤</sub>2N0,TRG1-2 was 94.9% and 5%, respectively. Overall survival and recurrence rate in the MRI non-γT<sub>≤</sub>2N0,TRG1-2 was 82.4% and 23.6%, respectively.

**Conclusions/Discussion:** Although MRI γT<sub>≤</sub>2N0,TRG1-2 cannot effectively predict complete pathologic responders, it can effectively predict a low rate of lymph node involvement and a better prognoses in patients submitted to total mesorectal excision. In patients with a poor health condition or the setting of a clinical trial, this could potentially help surgeons to decide to offer a minimally invasive approach such as transanal local excision in γT<sub>≤</sub>2N0,TRG1-2 patients with nearly complete endoscopic response, even though we should keep in mind about the quite high morbidity rate of local excision after neoadjuvant chemotherapy.

#### PREDICTORS OF 90-DAY READMISSION AFTER COLORECTAL CANCER SURGERY.

P226

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**Purpose/Background:** Patient readmission after surgery represents a significant burden to patients

and a substantial financial burden for hospitals. As a result, the Centers for Medicare and Medicaid Services (CMS) are imposing heavy financial penalties for these readmissions. Understanding the factors affecting readmission for colorectal cancer, the third most common cancer, is an important step toward the improvement of care for cancer patients and improving the efficiency of our healthcare system. We sought to determine the predictors of 90-day readmissions after surgery for colon and rectal cancer using a national dataset.

**Methods/Interventions:** We analyzed the national readmission dataset for all adult patients who underwent a colectomy or proctectomy for colon or rectal cancer between January and August of 2013. Patients with a readmission within 90 days of their hospital discharge were identified. Multivariable logistic regression analyses were used to determine predictors of 90 day readmissions. Variables in the model included patient demographics, comorbid conditions, procedure performed, location of the tumor, post-operative complications, length of stay, and facility level factors. Models accounted for clustering by facility.

**Results/Outcome(s):** A total of 37,358 patients underwent colon or rectal surgery for colorectal cancer. The mean age was 67 years and 51% were male. 79% had colon cancer while 21% had rectal cancer. A major complication occurred in 5,799 (15.5%) patients, the median length of stay was 6 days and 36,443 (97.6%) were discharged alive. 90 day readmissions occurred in 21.8% of eligible patients. Multivariable analysis revealed 90 day readmissions were more likely in patients with prolonged length of hospital stay (OR 1.33, 95%CI 1.23-1.42), those who suffered a major complication (OR 1.12, 95%CI 1.02-1.23), those with higher comorbidity score (OR 1.28, 95% CI 1.16-1.42), were discharged to a facility (OR 1.42

95%CI 1.31-1.53), government insurance compared with private insurance (OR 1.14 95%CI 1.05-1.23), teaching compared to nonteaching hospitals (1.13 95% CI 1.05-1.22). Laparoscopic surgery was associated with less readmissions than open surgery (OR 0.69 95%CI 0.65-0.74). The site of tumor within the colon was not associated with 90 day readmission.

**Conclusions/Discussion:** One in five patients undergoing surgery for colorectal cancer had at least one readmission within 90 days of discharge. We identify several factors associated with readmissions. Targeted interventions may decrease the number of these readmissions and lead to health care cost saving and efficiency.

#### FIRST SERIES WITH THE NEW ROBOTIC ENDO-WRIST STAPLERS FOR DA VINCI XI IN ANTERIOR RECTAL RESECTION FOR CANCER: A CASE-CONTROL COMPARISON WITH TRADITIONAL LAPAROSCOPIC STAPLERS.

P227

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**Purpose/Background:** The new robotic linear stapler, available for the Da Vinci Xi, is a new device directly controlled by the surgeon at the console and equipped with an Endo-Wrist technology. Our study aims to compare the operative and short-term results of the first group of patients undergoing an anterior rectal resection with total mesorectal excision (TME) for cancer, with the Da Vinci Xi and the new staplers, versus a comparable group in which we used the traditional laparoscopic staplers.

**Methods/Interventions:** From December 2015 to July 2016, fifteen patients underwent an anterior rectal

**P227 Table – Peri-operative records between the two study groups**

	Xi-RobSTAP (n=15)	Xi-TradSTAP (n=15)	P value
Totally Da Vinci Xi Anterior rectal resection (%)	15 (100)	15 (100)	0.99
Complete splenic flexure mobilization (%)	15 (100)	15 (100)	0.99
Conversion to laparoscopy or open (%)	0 (0)	0 (0)	0.99
Operative time (min) mean ± SD	315.0 ±59.1	295.0 ±60.8	0.2
Docking time (min) mean ± SD	21.5 ±5.9	21.4 ±5.6	0.9
N# stapler firing mean ± SD	2.1 ±0.2	2.9 ±0.6	0.001
Ileostomy (%)	13 (87)	13 (87)	0.9
Distal margin (mm) mean ± SD	14.9 ±10.9	23.9 ±10.4	0.13
N# lymph nodes mean ± SD	24.2 ±15.1	22.3 ±2.9	0.32
Post-operative hospital stay (days) mean ± SD	7.5 ±2.7	6.8 ±1.2	0.3
Post-operative minor surgical complications (%)	2 (13)	2 (13)	0.99
Anastomotic leak(%)	1 (7)	3 (13)	0.15
Time between primary surgery and stoma reversal (month) mean ± SD	2.7 ±2.1	4.2 ±3.1	0.17

resection with TME for cancer, using the robotic Endo-Wrist 45 mm staplers (group Xi-RobSTAP) at our multi-disciplinary robotic center. The results were compared, using a case-control methodology, with a similar pool of patients who performed the same type of intervention with the use of a 60 mm traditional laparoscopic endo-stapler, applied by the bed-side assistant (Xi-TradSTAP group). A diverting ileostomy was fashioned in 13 patients of each group.

**Results/Outcome(s):** No need to convert to laparoscopy or laparotomy in both groups. There were no significant differences in the two groups in mean operative time (315±59.2 min RobSTAP Xi group versus 295±60.8 min Xi-TradSTAP group,  $p=0.3$ ). In Xi-RobSTAP group we used a mean of 2.1±0.2 charges versus a mean of 2.9±0.5 in Xi-TradSTAP group ( $p=0.001$ ). The rates of intra-operative complications and the average hospital stay were similar (7.5±2.7 days in Xi-RobSTAP group versus 6.8±1.3 days in the Xi-TradSTAP group;  $p=0.5$ ). During the follow up period, anastomotic fistula at contrast enema (not symptomatic except for one case of Xi-TradSTAP group), was higher in the Xi-TradSTAP group, although without statistically significance (3 leak versus 1 leak in the Xi-RobSTAP group;  $p=0.15$ ). Time elapse between rectal resection and stoma closure as well, was shorter in the Xi-RobSTAP group (4.2±3.1 month in Xi-TradSTAP and 2.7±2.1 month in Xi-RobSTAP group;  $p=0.17$ ), although not statistically significant.

**Conclusions/Discussion:** In our preliminary experience the new robotic linear staplers seemed to give some advantages in terms of easy transection that could result in a reduction of average number of stapler firing used during rectal resection and with a lower incidence of anastomotic leakage. These promising data are very preliminary and need to be verified on a larger experiences.

## ROBOTIC COLO-RECTAL RESECTION WITH AND WITHOUT THE NEW INTEGRATED TABLE MOTION FOR DA VINCI XI: A CASE MATCHED STUDY.

P228

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**Purpose/Background:** The integrated table motion (ITM) (Trumpf Medical, Ditzingen, Germany) for da Vinci Xi is a new device which comprises a unique operating table wirelessly communicating with the da Vinci Xi surgical system, that enables patients to be repositioned with instruments inside the abdomen and without undocking the robot. Our study aims to compare operative and short-term outcomes of patients who underwent colorectal surgery for cancer with the da Vinci Xi system using the new ITM, versus a control group of patients undergoing the same procedures with the Da Vinci Xi, but without the use of the ITM.

**Methods/Interventions:** From December 2015 to October 2016, ten patients underwent robotic colorectal resection (6 anterior rectal resection ARR, 1 intersphincteric rectal resection IRS, 2 right colectomy RC, 1 sigmoid resection SIG) for cancer with the use of ITM (Xi-ITM group) at our center. The intraoperative and short-term results were compared, using case-control methodology, with a similar pool of patients who underwent robotic colo-rectal surgery for cancer without the use of the ITM device (Xi-No-ITM group). Post-operative complications were graded using the Clavien-Dindo classification. A propensity scores approach was performed to create 1:2 matched pairs (matching the Xi-ITM subjects to Xi-No-ITM subjects according to BMI, age, gender, ASA score and intervention type) using a caliper method

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	Xi-ITM	Xi-No-ITM	p
Age (y)	68.7	71.9	ns
BMI (n)	23.4	24.0	ns
ASA (n)			
I	0	2	ns
II	9	13	ns
III	1	5	ns
Overall Operative Time (mean, minutes)	333.50	304.29	ns
Robotic Operative Time (mean, minutes)	227.11	297.45	0.041
Conversion (n)	0 (0%)	2 (10%)	ns
Post-operative complications (n)	1 (10%)	11 (55%)	0.024
Wound Infection	1 (10%)	2 (10%)	
Pneumonia	0 (0%)	3 (15%)	
Atrial Fibrillation	0 (0%)	2 (15%)	
Anemia	0 (0%)	3 (15%)	

algorithm. Independent t tests and  $\chi^2$  test (or Fisher's exact test) were performed to compare different variables between Xi-ITM and Xi-No-ITM groups.

**Results/Outcome(s):** There was a significant difference in the two groups in mean overall robotic operative time (227 min in Xi-ITM group versus 297 min in Xi-No-ITM group,  $p=0,04$ ). Surgeries were fully robotic in all Xi-ITM cases, while two cases of Xi-No-ITM group were converted to open surgery because of bulky tumors and difficult exposure (0 vs 2,  $p=NS$ ). Postoperative medical complications, all of grade I or II, were higher in Xi-No-ITM group (1 vs 11,  $p=0,024$ ).

**Conclusions/Discussion:** In our early experience the use of new Integrated Table Motion for da Vinci Xi resulted in a simplification of workflow. The better exposure of operative field and the possibility to change repeatedly the patients position, without undocking the patient side cart or removing instruments, resulted in a reduced overall robotic operative time and could result in a lower conversion rate as well. The lower postoperative medical complications rate could be due to reduced use of extreme positions to gain optimal exposure of operative field, that resulted in a less hemodynamic, respiratory or soft tissue injuries. However, further experience is necessary to confirm our data.

## ARE ALL RECTAL CANCERS CREATED EQUALLY? A LONGITUDINAL ANALYSIS OF HOW TUMOR LOCATION AFFECTS CANCER RECURRENCE RATES.

P229

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**Purpose/Background:** **Purpose:** To evaluate the impact of tumor distance from the anal verge (AVTD) on metastatic spread and local recurrence patterns in rectal cancer.

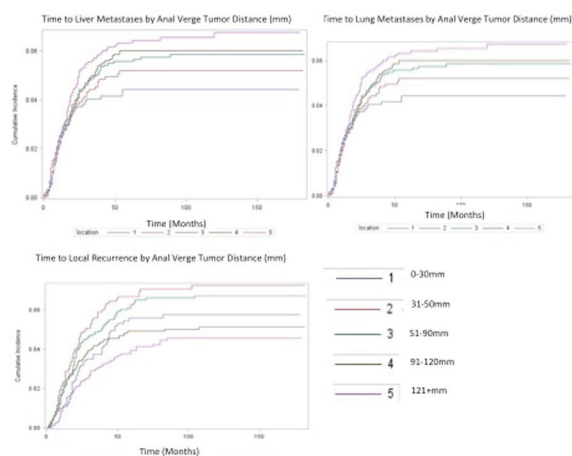
**Background:** Despite curative rectal cancer resection, many will experience distant metastases or local recurrence. Primary tumor location is emerging as an important prognostic factor. However, how the anatomical location of the tumor impacts metastatic spread for rectal cancer is unknown.

**Methods/Interventions:** The Norwegian nationwide surgical quality registry was reviewed for all rectal cancer resections with curative intent from 1/1/1996-12/15/2006. This compulsory database records all cases of malignant solid tumors, with all staging, management, complication, recurrence, and mortality data, for near 100% data capture. Tumor location was defined as the distance from the anal verge to the distal tumor border. Cancers were stratified into five AVTD groups: 0-3cm, >3-5cm, >5-9cm, >9-12 cm, and 12cm-HI. Competing risk analysis

and proportional hazards models were used to assess the relationship between AVTD and patterns of recurrence.

**Results/Outcome(s):** 6859 patients surgically cured for rectal cancer were included-the AVTD distribution was 0-3 cm, 13.7%; 3.1-5, 15.2%; 5.1-9 cm, 23.7%; 9.1-12 cm, 26%; AV 12-HI, 21.3%. The median follow-up time was 49 months (IQR 20-93). Overall, 1981 patients (28.8%) experienced cancer recurrence (AVTD 0-3: 3.9%; 3.1-5: 3.5%; 5.1-9: 6.4%; 9.1-12: 6.5%; 12.1-HI: 7.4%). The probability of liver metastases increased with high tumors (HR: 1.49,  $p=0.03$ ), while the probability of lung metastases decreased with high tumors (HR 0.66,  $p=0.03$ ). The probability of local recurrence increased with low rectal tumors (HR 1.46,  $p=0.04$ ). Overall, low rectal cancers had the lowest probability of survival. For liver and lung metastases, time to metastases was directly associated with increased AVTD (Liver 0-3: 10 months vs.12-HI: 16 months;  $p<0.0001$ ; lung 0-3: 23.5 months vs. 12-HI: 28 months,  $p<0.0001$ ) ( $p<0.0001$ ). Compared to liver metastases, lung metastases appeared approximately 12 months later,  $p<0.0001$ . Irrespective of tumor location, there were significant differences in median time to recurrence by site: liver 14 months, local at 19 months, and lung at 25 months,  $p<0.0001$ .

**Conclusions/Discussion:** The anatomical location of the tumor impacts metastatic spread for rectal cancer. Anal verge-tumor distance was associated with patterns of metastases and survival. Anal verge-tumor distance also impacted time to metastases overall and specifically for liver, lung, and local recurrence. This has important implications for tailoring treatment and surveillance protocols.



## BOWEL PREPARATION AND PERIOPERATIVE COMPLICATIONS IN TRANSANAL ENDOSCOPIC MICROSURGERY: A SYSTEMATIC REVIEW.

P230

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**Purpose/Background:** Historically, mechanical bowel preparation (MBP) has been used pre-operatively for colorectal surgery and was thought to cleanse the bowel and decrease the bacterial load within the colon. Multiple systematic reviews and meta-analyses have since proven that MBP is not superior to no preparation with regards to reduction of surgical site infections, anastomotic leaks, and post-operative sepsis for most elective colorectal procedures, and can be safely omitted from routine pre-operative care. Transanal endoscopic microsurgery (TEM) requires patients to receive pre-operative bowel preparation to allow for adequate visualization of the rectum. There is no current consensus within the TEM community on whether MBP or fleet enema represents the preferred bowel preparation regimen. The objective of this systematic review is to gather data from the literature to compare pre-operative MBP and fleet enema in terms of their impact on post-operative complication rates and quality of bowel preparation in TEM.

**Methods/Interventions:** The electronic databases of Embase, Cochrane Library, and Ovid MEDLINE were systematically searched for TEM related studies. Only full length, English language articles with  $n \geq 100$  were included. Each study was then assessed for author description of type of bowel preparation as well as documentation of post-operative outcomes. The primary endpoint was overall complication rates. Secondary endpoints were subgroup post-operative complication rates and surgeon satisfaction with bowel preparation.

**Results/Outcome(s):** Of the initially identified 752 studies, 21 were included in our analysis. A total of 3567 patients from 16 studies were in the MBP group, and 819 patients from 5 studies were in the enema group. The overall post-operative complication rates were comparable between both groups (MBP – 13.9% vs fleet enema – 16.8%,  $p = 0.47$ ). The most common post-operative complication was urinary retention, which was comparable between groups (MBP – 4.2% vs fleet enema – 6.1%,  $p = 0.59$ ). Rates of infectious complications were also comparable (MPB – 2.0% vs fleet enema – 2.6%,  $p = 0.45$ ), as were bleeding complications (MBP – 3.2% vs fleet enema – 2.12%,  $p = 0.42$ ). There was no data on the quality of bowel preparation or surgeon satisfaction with preparation available.

**Conclusions/Discussion:** There is no evidence to suggest that MBP has any advantage over fleet enema for pre-operative bowel preparation. However, there is

currently no data from randomized controlled trials directly comparing MBP and fleet enema. Our review suggests that clinical equipoise exists with regards to pre-operative bowel preparation in the TEM population but further studies are required. We plan to design a multi-center RCT to compare enema and MBP to assess for quality of preparation and post-operative complications with the hypothesis that fleet enema is non inferior to MBP in the context of TEM.

## GLOBAL DISPARITIES IN OPERATIVE MANAGEMENT AND LYMPH NODES HARVEST OF COLORECTAL CANCER.

P231

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**Purpose/Background:** Colorectal cancer is the fourth most common cancer in men and the third most common cancer in women worldwide. There is significant variation in surgical practice behind the operative management of colorectal cancer. The aim of this study was to describe the differences in operative management of colorectal cancer patients in five countries.

**Methods/Interventions:** Institutional data was gathered by chart review from five separate teaching institutions: the Brigham and Women's Hospital in Boston, Massachusetts, Seoul National University Hospital in Seoul, South Korea, Ivano-Frankivsk Regional Cancer Hospital in Ivano-Frankivsk, Ukraine, Maria Sklodowska-Curie Institute of Oncology in Krakow, Poland, and University of Palermo Hospital in Palermo, Italy. A retrospective review was performed of all patients ( $n=2,021$ ) who underwent resection for colorectal cancer in the five hospitals from 2011-2015. Demographic, tumor and operative treatment characteristics were compared utilizing paired T-test where appropriate. Multivariate regression was performed to rule out confounding factors for ostomy creation.

**Results/Outcome(s):** Laparoscopy was more likely to be utilized in the United States (US) at 46% than in any other country ( $p<0.01$ ), followed by South Korea at 23.9% and Italy at 9.3%. Poland and Ukraine used laparoscopy least at 1.6% and 0.9%. The number of lymph nodes retrieved during surgery was highest in South Korea with a mean of 24.7 lymph nodes per surgery, followed by US at 21.6 and Italy at 20.4. Average number of lymph nodes retrieved was lowest in Poland and Ukraine at 12.1 and 7.7. Italian patients were more likely to receive stapled anastomosis at 96.4% than Korean (80.7%,  $p<0.01$ ), Polish (59%,  $p<0.01$ ), and Ukrainian patients (2.2%,  $p<0.01$ ). South Korea (9%) had significantly lower number of temporary stomas than USA (23.3%,  $p<0.01$ ), Italy (13.8%,  $p=0.01$ ),



and Ukraine (12%,  $p=0.04$ ). Permanent stomas were most common in Italy at 20.2%, followed by Ukraine (15.8%), Poland (12.7%), and US (12.3%). South Korea had significantly lower number of permanent stomas than all other countries (3.4%,  $p<0.01$ ).

**Conclusions/Discussion:** There are widespread differences with respect to operative management of colorectal cancer with significant disparities in the use of laparoscopy and lymph node harvest in the Eastern European countries.

### DEFINING THE ROLE OF POST-TREATMENT MAGNETIC RESONANCE IMAGING DURING THE EVOLUTION OF A MULTIDISCIPLINARY RECTAL CANCER TUMOR BOARD.

P232

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**Purpose/Background:** Background- While not standard, post-treatment MRI after chemoradiotherapy (CRT) has value in potentially changing the surgical course. Controversy exists on the role of MRI after CRT, and little study has been done to evaluate the agreement of MRI with postoperative pathologic staging. Objective- To evaluate the concordance of the pre and post-treatment MRI and pathologic staging in rectal cancer patients.

**Methods/Interventions:** A prospective institutional colorectal cancer registry was reviewed for rectal cancer cases from 2012-2016, during the evolution of a multidisciplinary tumor board and implementation of synoptic reports. Patients undergoing neoadjuvant chemoradiation (long course radiation with concurrent chemotherapy) for rectal cancer, had a pre-treatment and post-treatment pelvic MRI, and curative surgical resection within 6-12 weeks after therapy were evaluated. The MRI results and pathological staging (pT) were compared. The measure of agreement between reported disease stages was assessed by Cohen's Kappa statistics. The main outcome measures were the MRI test accuracy, percent over- and under-staged, sensitivity, specificity, and weighted kappa coefficients between the MRI studies and final pathological results.

**Results/Outcome(s):** 57 patients met inclusion criteria and were analyzed. Overall, there was fair concordance of MRI restaging after preoperative CRT with pathological results (Kappa 0.350 (95% CI 0.174, 0.526)). The overall accuracy of the post-treatment MRI for T staging was 49.1%, with increasing accuracy for advanced stages T3 and T4. Using the pathology as the gold standard, 42.3% of patients were overstaged and 19.8% were understaged. Only 16.7% (1/6) of patients with pathological complete response (pCR) were staged correctly by the post-treatment MRI; the other 5 (83.7%) were overstaged. There was fair agreement between the initial and post CRT MRI stage (Kappa 0.393 (95%CI 0.236, 0.550)). The initial MRI

stage had poor agreement with the pT stage (Kappa 0.063 (95% CI -0.050, 0.177)). The accuracy of the pre-treatment MRI compared to pathologic T staging was 40.4%, and again increased with increasing stage. MRI had high specificity but low sensitivity for correctly staging T0, T1 and T3 cancers.

**Conclusions/Discussion:** This study confirms the lack of concordance of MRI- both pre and post chemoradiotherapy- with the surgical pathology in rectal cancer. This work has implications for relying on the post-treatment MRI T-staging to facilitate surgical planning, especially for pCR and early disease stage patients. T stage alone should not drive the surgical plan. Given these findings, future study could focus on using a post-treatment MRI with additional details, such as tumor regression grade, circumferential resection margins, and extramural vascular invasion, to guide management.

### A CORRELATION BETWEEN EXTRAMURAL VASCULAR INVASION AND DNA HYPERMETHYLATION IN RECTAL CANCER.

P233

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**Purpose/Background:** DNA hypermethylation in specific gene promoter regions (CpG islands) is emerging as an important pathway in colorectal cancer tumorigenesis, and CpG Island Hypermethylation Phenotype (CIMP) a potential new biomarker which may guide personalised patient care. Certain genetic mutations have been associated with extramural vascular invasion (EMVI) in rectal cancer, but no such association has yet been made with epigenetic factors. This study aims to investigate an association between EMVI, CIMP, and pathological and clinical outcomes in patients with rectal cancer.

**Methods/Interventions:** 95 patients from a prospectively maintained database of rectal cancers treated surgically at a single centre were assessed for EMVI status (positive or negative) on histological examination of rectal resections. Patients were selectively sampled to provide a balance of positive and negative EMVI tumours (44 EMVI positive), but matched for age, gender, and height of tumour. Tumour DNA was extracted from formalin-fixed paraffin-embedded slides and subjected to methylation specific PCR to determine methylation status for the epigenomes of 8 genes associated with CIMP, and characterised as CIMP high, intermediate, or low based on Jass Classification. None of the patients had received neoadjuvant therapy. EMVI, histological, and clinical parameters were examined for correlation to CIMP status, as well as with overall and disease free survival.

**Results/Outcome(s):** Patients with EMVI positive tumours had significantly more advanced disease based on

pT, pN, and pAJCC classification (each  $p < 0.01$ ), a greater number received adjuvant chemotherapy than the EMVI negative group ( $p < 0.01$ ), and EMVI positivity was a marker of reduced disease-free and overall survival ( $p = 0.018$  and  $p = 0.024$ , respectively). Of the 95 patients, there were 46 patients with CIMP low, 48 with CIMP intermediate, and 1 patient with a CIMP high epigenotype. On multivariable analysis, patients CIMP intermediate tumours had a significant association with EMVI positivity compared to the CIMP low methylation epigenotype ( $p = 0.008$ ).

**Conclusions/Discussion:** These results demonstrate that there is a clear relationship between CIMP status and extramural vascular invasion in rectal cancer, which in turn is associated with worse disease staging and predicts poor survival in these patients. The finding warrants

further exploration of the potential to utilize methylation biomarker panels to inform treatment decisions in rectal cancer, and investigation of cellular mechanisms linking CIMP to EMVI with the aim of providing opportunities for therapeutic intervention.

**P232 Relationship of Pre and Post MRI to Surgical Pathology**

Post Treatment MRI to Surgical Path		pT Stage					Total
		T0	T1	T2	T3	T4	
Post Treatment MRI	T0	1	1	1	0	0	3
Statge	T1	1	2	1	0	0	4
	T2	2	1	3	5	0	11
	T3	1	2	6	20	1	30
	T4	1	1	0	5	2	9
Overstaged, Understaged (%)		83.3%, 16.7%	57.1%, 14.3%	54.5%, 18.2%	16.7%, 16.7%	0%, 33.3%	
Accuracy (%)		16.70%	28.60%	27.30%	66.70%	66.70%	49.10%
Sensitivity, Specificity (%)		16.7%, 96.1%	28.6%, 96%	27.3%, 82.6%	66.7%, 63%	66.7%, 87%	
Initial MRI to Surgical Path		pT Stage					Total
		T0	T1	T2	T3	T4	
Initial MRI stage	T0	0	0	0	0	0	0
	T1	0	0	0	0	0	0
	T2	0	2	2	4	0	8
	T3	5	2	8	19	1	35
	T4	1	3	1	7	2	14
Overstaged, Understaged (%)				100%, 0%			
Accuracy (%)		0.00%	0.00%	18.20%	63.30%	66.70%	40.40%
Sensitivity, Specificity (%)		0%, 100%	0%, 100%	81.8%, 0%	23.3%, 13.3%	0%, 33.3%	
Initial MRI to Post Treatment MRI		Post Treatment MRI stage					Total
		T0	T1	T2	T3	T4	
Initial MRI stage	T0	0	0	0	0	0	0
	T1	0	0	0	0	0	0
	T2	0	4	6	2	0	0
	T3	2	1	8	30	3	44
	T4	2	0	1	5	10	18
Overstaged, Understaged (%)		100%, 0%	100%, 0%	60%, 0%	13.5%, 5.4%	0%, 23.1%	
Accuracy (%)		0.00%	0.00%	40.00%	81.10%	76.90%	62.20%
Sensitivity, Specificity (%)		0%, 100%	0%, 100%	40%, 89.8%	81.1%, 62.2%		

Kappa Values (95%CI): Post Treatment MRI to Surgical Pathology 0.350 (0.174, 0.526); Initial MRI to Surgical Pathology 0.063 (-0.050, 0.177); Initial MRI to Post Treatment MRI 0.393 (0.236, 0.550)

## PROGNOSTIC IMPACT OF PREOPERATIVE CARCINOEMBRYONIC ANTIGEN (CEA) LEVEL IN STAGEIII COLORECTAL CANCER.

P234

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**Purpose/Background:** Preoperative serum CEA has been reported to be a stage-independent risk factor for poor prognosis in colorectal cancer. The aim of this study was to evaluate the prognostic impact of preoperative serum CEA level in patients with StageIII colorectal cancer.

**Methods/Interventions:** A retrospective review was conducted on fifty-three patients who underwent curative resection for StageIII colorectal cancer from January 2010 to December 2014. Patient demographics, operative details, and surgical outcome were analyzed. Prognostic significance was determined using log-rank test.

**Results/Outcome(s):** StageIIIA, StageIIIB, and StageIIIC were identified in one, 28, and 24 patients, respectively. At a median follow-up of 35 months, the 3-year estimated overall survival (OS) and relapse-free survival (RFS) of all patients were 64.8 and 51.9 %, respectively. The 3-year OS of patients with StageIIIA/IIIB, and StageIIIC were 78.7% and 46.8%, respectively ( $P < 0.01$ ). Analysis of survival revealed a significant worse 3-year OS of elevated-CEA level ( $> 5\text{ng/mL}$ ) patients (26.7%) compared with that of the normal CEA level patients (65.6%) with StageIIIC colorectal cancer ( $P < 0.05$ ). The 3-year RFS of the patients with elevated preoperative CEA and normal CEA was 0% and 44.4%, respectively ( $P < 0.01$ ).

**Conclusions/Discussion:** Our results suggest that an elevated preoperative CEA level is strong predictor of recurrence and poor prognosis for StageIIIC colorectal cancer after radical surgery. These patients should therefore be considered candidates for receiving novel multimodality treatment such as neoadjuvant chemotherapy.

## LAPAROSCOPIC PROCTECTOMY FOR RECTAL CANCER: DON'T RULE IT OUT YET.

P235

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**Purpose/Background:** Recent studies failed to prove non-inferiority of minimally invasive techniques for rectal cancer (RC) despite strict criteria for surgeon participation. It is not yet clear whether the difference in outcomes is inherent to minimally invasive techniques. We hypothesized that at a high volume minimally invasive center outcomes might be improved compared to laparoscopic results in the ALaCaRT and ACOSOG Z6051 studies.

**Methods/Interventions:** A retrospective review of patients undergoing laparoscopic proctectomy for RC between 2007-2015 at a high volume, tertiary care center was performed. Similar to ALaCaRT and ACOSOG, patients with stage IV, recurrent RC, or those with incomplete data were excluded. Patient demographics, tumor location, operative data and pathologic findings were collected. Primary outcomes were positive circumferential resection margin (CRM), distal margin (DM), and incomplete total mesorectal excision (TME). Standardized TME quality grading was available after 2012.

**Results/Outcome(s):** There were 89 patients (60% male) eligible for inclusion. The mean age was 66.3, and mean BMI was 28.4. Tumor location was upper rectum: 13 (15.9%); mid rectum: 49(59.8%); lower rectum: 20(24.4%) Mean distance from the anal verge was 6.8 cm. Preoperative clinical staging was Stage I: 17(19.1%), II 32(36%), and III 40(44.9%). 79.8% of patients received preoperative chemoradiation. The conversion rate to open procedure was 24.7%. Low anterior resection (LAR) with colorectal anastomosis was performed in 14(15.7%) cases, 57(64%) had LAR with coloanal anastomosis, and 23(25.8%) had abdominoperineal resection. The mean length of stay was 5.6 days with an overall complication rate of 37.1%. CRM was  $\geq 1\text{mm}$  in 87 (97.8%) of patients. Mean DM was 3.8 cm; 97.8% of patients had a negative DM. Of

**P235 Comparison of Laparoscopic Outcomes**

	Current Study	ACOSOG	ALaCaRT
Patients	87	240	238
Mean Tumor Height, cm (SD)	6.8 (2.9)	6.1 (3.1)	80% $< 10\text{cm}$
CRM $\geq 1\text{mm}$	87 (97.8%)	211 (87.9%)	222 (93%)
CRM $> 1\text{mm}$			211 (87.9%)
DM Negative	87 (97.8%)	98.3%	236 (99%)
Mean DM, cm (SD)	3.8 (3.7)	3.2 (2.6)	
Median DM, cm (IQR)	3 (2.0-4.7)		2.6 (1.5-4.5)
Complete or Near Complete TME	33 (100%)	95.1%	230 (97%)
Successful Laparoscopic Resection	87.9%	81.7%	82%
Successful Open Resection		86.9%	89%

patients with TME grading, 29(87.9%) had complete and 4(12.1%) had near complete TME. Using ACOSOG criteria, 87.9% of eligible patients had a “successful resection”. Comparisons to ACOSOG and ALaCaRT oncologic outcomes are shown in Table 1.

**Conclusions/Discussion:** High volume minimally invasive centers may be able to achieve RC oncologic outcomes that are more favorable than demonstrated in the recent randomized studies. Practitioner and institutional outcomes should be evaluated to determine optimal surgical technique and these may vary by site and surgeon.

### IMPACT OF PRIMARY TUMOR RESECTION IN COLORECTAL CANCER WITH UNRESECTABLE METASTASIS.

P236

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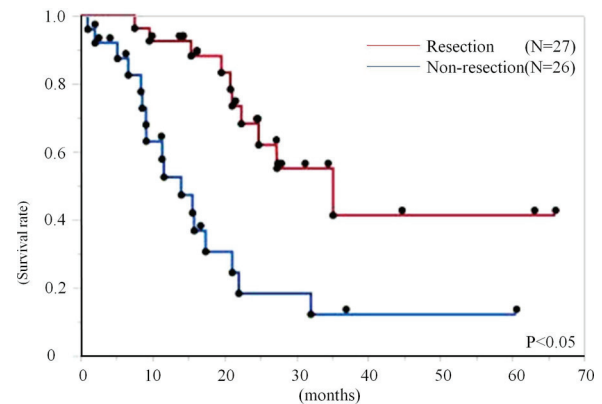
**Purpose/Background:** To assess whether palliative primary tumor resection in colorectal cancer patients with unresectable metastasis is associated with improved survival.

**Methods/Interventions:** We retrospectively analyzed the survival period of 56 colorectal cancer patients with unresectable metastasis diagnosed from January 2010 to December 2015 and compared the patients who underwent primary tumor palliative resection of the patients who did not. The clinico-pathological variables of the two groups, such as age, gender, albumen, hemoglobin, K-RAS Exon 2 status, pathology, primary tumor location, state of obstruction, metastatic site and number, the factors for that the patients diagnosed with the unresectable and the types of received systemic therapies, were compared using Fisher's exact test, and survival analysis was conducted using Kaplan–Meier methods. Cox proportional hazards regression models were fitted to evaluate the relationship between overall survival and palliative resection as well as other clinico-pathological variables.

**Results/Outcome(s):** Thirty seven colon cancer and 16 rectal cancer patients were entered the analysis. The median age was 64 years old and male to female ratio was 27: 26. Twenty seven patients underwent primary tumor palliative resection and 26 patients did not. The clinico-pathological characteristics except state of obstruction did not significantly differ between the two groups. In the resection group, more patients had obstructive symptom than the non-resection group (77% vs 34%,  $p<0.01$ ). The patients who underwent primary tumor palliative resection had prolonged median survival compared with patients never resected (35 vs 14 months,  $p<0.01$ ). Univariate analysis identified possible prognostic variables as albumen less than 3.5 (HR; 2.0, 95% CI; 0.94-4.47,  $p=0.06$ ), right side tumor (HR; 2.3, 95% CI; 1.09-5.44,  $p=0.02$ ), K-RAS

Exon 2 mutation (HR; 2.9, 95% CI; 1.31-6.67,  $p<0.01$ ), and resection of primary lesion (HR; 3.8, 95% CI; 1.74-8.71,  $p<0.01$ ). And resection of primary lesion was solely a significant predictor of survival in Cox multivariate regression analysis (HR; 2.9, 95% CI; 1.28-6.97,  $p<0.01$ ).

**Conclusions/Discussion:** Palliative primary tumor resection in colorectal cancer patients with unresectable metastasis is possibly associated with improved survival.



### COMPLETION PROCTECTOMY IN CROHN'S DISEASE.

P238

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**Purpose/Background:** Crohn's colitis requiring urgent surgical intervention is usually treated with a total abdominal colectomy with end ileostomy (TAC with EI). Completion proctectomy may be considered for a later date, but the percentage of patients that go on to completion is low. The aim of the study is to determine factors that influence a patient's decision to have a completion proctectomy (CP) and assess quality of life changes associated with CP.

**Methods/Interventions:** A retrospective study examined patients with Crohn's disease who underwent TAC with EI between 2000-2016 through a phone interview. Patients were grouped by whether or not they underwent completion proctectomy. Patients were queried as to their factors influencing their decision for CP. The Short QOL questionnaire for inflammatory bowel disease was used to assess Quality of Life (scoring 10-70). A paired student's t-test was used to analyze the SF-QOL data, and a Log-Rank test was used for time of disease to TAC.

**Results/Outcome(s):** There were 43 patients that underwent TAC with EI during the study period. The average age was 42 years old and 65% were female. There was a significant difference in median time to TAC from initial diagnosis (No CP: 11 years vs CP: 5 years;  $P=0.01$ ). There was no significant difference between the two groups in terms of current use of IBD medications (50% in

CP group and 44% in TAC with EI group). The most frequent indication for initial surgery was non-responsiveness to medical therapy (39.5% overall). Only 29% of patients had a discussion about the possible need for completion proctectomy prior to TAC with EI. Of the patients who chose to forego the second surgery, the two most common reasons were lack of symptoms (55%) and no desire to have another surgery (27.6%). There was no difference in overall QOL score (No CP: 44.1 vs CP: 38.7;  $P=0.27$ ). Of the patients who went on to CP, 92.9% were satisfied with their outcome. When asked to rank their overall satisfaction with their QOL on a scale of 1-5 (5 highest), there was no difference between the two groups (No CP 3.9 vs CP 3.5;  $P=0.24$ ). Median time to second surgery was 1.4 years (range 5 months-5 years).

**Conclusions/Discussion:** The predominant factor in a patient's decision to proceed with CP was persistence of symptoms. There was no difference in QOL between the two groups and the majority of patients were satisfied with their QOL. Our findings displayed a trend towards CP among patients with a shorter time interval from diagnosis to TAC with EI. This is important to consider during preoperative counseling for TAC with EI, especially as most patients did not discuss possible CP prior to initial surgery. While a "wait and see" approach to follow symptoms is certainly prudent, perhaps patients may be better prepared for CP with this knowledge. However, with the majority of patients retaining their rectum and still obtaining high QOL, proctectomy is not a necessary fate of all.

#### MOLECULAR PROFILING AND MUTATION PREVALENCE IN PATIENTS WITH PRIMARY RESECTABLE VERSUS PRIMARY UNRESECTABLE METASTATIC COLORECTAL CANCER.

P238A

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**Purpose/Background:** Tumor molecular heterogeneity is thought to account for variability in tumor invasive and metastatic potential. Molecular profiling (MP) is more frequently used to assess tumors for use of approved and experimental therapies, as well as to provide insight into broader tumor heterogeneity. Our goal was to evaluate the variability in prevalence of somatic mutations discovered by MP in patients with primary resectable (PR) versus primary unresectable (PU) metastatic colorectal cancer (mCRC).

**Methods/Interventions:** This is an IRB-approved, retrospective study in patients with mCRC who underwent MP between March 2007 and August 2016 at a tertiary care cancer center [Fox Chase Cancer Center, Philadelphia, PA (FCCC)]. Patients were divided into 2 groups: primary

resectable (PR): patients with any stage disease amenable to R0 resection that later recurred as stage 4 and primary unresectable (PU): patients with stage 4 disease who were unresectable at diagnosis. Tissue samples were submitted for MP using our 50 gene FCCC Targeted Cancer Panel (FTCP) and 2 expanded MP platforms: Foundation One (~300 genes) and Caris (~600 genes). Data regarding demographics, mutations detected and the use of EGFR targeted therapy (ETT) was collected and analyzed. Statistics were calculated using Chi-square and Mann-Whitney U tests.

**Results/Outcome(s):** 213 patients were analyzed. Most patients were male (58%) and white (80%). 43% were in the PR group and 57% were in the PU group. Stage distribution at diagnosis in the PR group included: stage 1 (6%), stage 2 (27%), stage 3 (41%) and stage 4 (23%); all patients in the PU group were stage 4 at diagnosis. FTCP was used in the majority of patients (87% PR and 88% PU); expanded MP testing after FTCP was uncommon (2% of the PR group and 0% in the PU group). Expanded MP panels were used in 16% of PR patients and 12% of PU patients ( $p=0.515$ ). The most common actionable mutation detected in both groups was *KRAS* (48% PR and 48% PU). Other actionable mutations detected included *PIK3CA* (17% PR and 9% PU) ( $p=0.071$ ), *BRAF* (7% PR and 4% PU) ( $p=0.438$ ) and *EGFR* (1% PR and 2% PU) (0.725). A wild type (WT) *KRAS* gene was identified in the majority of patients (54% PR and 57% PU) ( $p=0.672$ ). ETT was used in 23% PR WT patients versus 12% PU WT patients ( $p=0.123$ ). The median time from diagnosis to ETT was 6 months in the PR group and 1.4 months in the PU group ( $p=0.535$ ). The median time from MP to death was 13 months in the PR group and 7.7 months in the PU group ( $p=0.072$ ).

**Conclusions/Discussion:** MP detected *KRAS* mutations in almost 50% of patients with mCRC in our cohort. Targeted and expanded panels used in the PR and PU groups were associated with variability in the identification of actionable targets and variability in the use of EGFR targeted therapy.

#### THE IMPACT OF SUBSPECIALTY ON 30-DAY MORTALITY FOR ELECTIVE AND EMERGENCY CASES IN COLORECTAL SURGERY: A 10-YEAR REVIEW.

P239

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**Purpose/Background:** The paradox of zero mortality is still haunting the surgical literature. The aim of this study was to evaluate the impact of a colorectal subspecialty on postoperative mortality rates.

**Methods/Interventions:** A retrospective comparison of prospectively collected data was carried out for consecutive patients undergoing elective or emergency resections by colorectal surgeons in a single institution. NSQIP data 2006-2009 were compared to NSQIP data 2010-2015. The latter data were supplemented with an IRB-approved chart review. Primary endpoint was defined as 30-day postoperative death. Postoperative mortality was defined as death within 30 days after surgery. Postoperative complications were assessed using the Clavien-Dindo classification scale.

**Results/Outcome(s):** 439 colorectal cases were performed by 7 general surgeons (2006-2009); 2898 cases were performed by 7 colorectal surgeons (2010-2015). Yearly NSQIP 2006-2009 mortality rates were 6.8%, 3.45%, 3.48%, and 8.16%. Yearly NSQIP 2010-2015 mortality rates were 2.33%, 2.00%, 3.42%, 4.24%, 1.40% and 0.60%. Of 36 deaths from 2010 to 2015, there were 27 emergency and 9 elective cases, with a median ASA class of 4 (1-5): 31 laparotomies and 5 laparoscopies. Postoperative complications included anastomotic leak, bleeding, enterotomy, evisceration, rectal stump blowout, small bowel ischemia. Thirteen of 36 patients underwent multiple re-operations.

**Conclusions/Discussion:** This study showed that introducing a colorectal subspecialty into an institution resulted in decreased postoperative mortality rates.

#### FAILURE TO RESCUE IN POSTOP PATIENTS WITH COLON CANCER: TIME TO RETHINK WHERE YOU GET YOUR SURGERY.

P240

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**Purpose/Background:** Failure to rescue (FTR) is an important measure of quality of care. The aim was of this study was to assess FTR in patients with CC who underwent surgical resection. We hypothesized that patient managed in urban centers had lower FTR

**Methods/Interventions:** National estimates for patients with CC were abstracted from the National Inpatient Sample (NIS) database (2011). FTR was defined as death after major complications. Major complication was defined as myocardial infarction, stroke, pulmonary embolism, ARDS, sepsis, and anastomotic leak. Patients were stratified based on location of treatment: Urban vs rural. Outcome measure was FTR. Regression analysis was performed to assess for independent factors associated with FTR.

**Results/Outcome(s):** A total of 49,789 patients with CC who underwent surgery were analyzed. The mean age was 71.2±19.8 years with 59% being males. 20.1% patients had in-hospital complications and 7.9% patient had major complications. The overall mortality rate was 3.6%. Patient

managed in rural centers had higher FTR compared to urban centers (38.2% vs 29.7%, p=0.039). On regression analysis after controlling for age, gender, type of procedure, Charlson comorbidity index, insurance status, management in rural center was independently associated with FTR (OR[95% CI]: 1.4[1.1-2.2], p=0.041). On sub-analysis of urban centers, management in teaching urban hospital was independently associated with higher FTR (OR[95% CI]: 1.2[1.06-2.8], p=0.045).

**Conclusions/Discussion:** Disparities exists among centers managing CC patient undergoing surgical intervention. Rural centers have higher FTR compared to similar cohort of patients managed in urban centers. Teaching urban hospital performed worse than non-teaching urban centers. Understanding the reason for these differences may help standardize care across centers and help improve patient outcomes.

#### IMPLEMENTATION OF A DEDICATED ENHANCED RECOVERY AFTER SURGERY PROTOCOL REDUCES POSTOPERATIVE DEHYDRATION FOLLOWING ILEOSTOMY CREATION.

P241

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**Purpose/Background:** Ileostomy creation is a commonly performed procedure in colon and rectal surgery. Although the technique of ileostomy creation is often a simple, well-described procedure, it is not without morbidity. The most frequently cited complication of ileostomy creation is dehydration due to high ostomy output, ranging between 10-40%. The primary outcome of this study was to assess the effect of the implementation of an Enhanced Recovery After Surgery (ERAS) protocol on the rate of dehydration after ileostomy creation.

**Methods/Interventions:** A retrospective review of a prospectively maintained colorectal database at a single tertiary institution was performed. In April 2015, PIVC line insertion for outpatient intravenous fluid (IV) hydration was implemented as a part of the ERAS protocol. IV hydration was adjusted according to monitored outpatient ileostomy output. All patients who underwent ileostomy creation prior to ERAS implementation (April 2012 to October 2013) were compared to all patients who had ileostomies created after ERAS implementation (April 2015 to October 2016).

**Results/Outcome(s):** A total of 116 patients were included in the study. 57 patients had ileostomies created in the pre-ERAS group and 59 patients in the post-ERAS group. Ultralow anterior resection was the most frequently performed primary procedure (35%), with rectal cancer being the most frequent indication (40%). 10 patients

(17.5%) experienced dehydration in the pre-ERAS group and 1 patient (1.7%) in the post-ERAS group ( $p < 0.01$ ). Following ERAS implementation, unplanned outpatient clinic and emergency department visits for dehydration significantly reduced from 14% ( $n=8$ ) to 1.7% ( $n=1$ ;  $p= 0.01$ ). In addition, readmissions due to dehydration decreased from 6 (17%) to 1 (5%) after the ERAS protocol was implemented ( $p= 0.05$ ).

**Conclusions/Discussion:** Dehydration is a common complication following ileostomy creation, usually due to high ostomy output. This study demonstrates the inclusion of outpatient IV hydration and monitoring of ileostomy output as a part of an ERAS protocol reduces the overall number of patients presenting with dehydration and decreases the number of patients presenting with severe dehydration requiring readmission.

#### EFFICACY OF CARBOHYDRATE LOADING PRIOR TO ROBOTIC ASSISTED LOW ANTERIOR RESECTION FOR RECTAL CANCER: A SINGLE INSTITUTION STUDY.

P242

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**Purpose/Background:** There is much interest in improving outcomes after elective colorectal surgery for rectal cancer. The Enhanced Recover after Surgery (ERAS) pathway has been shown to be safe and effective in reducing overall complications and length of hospital stay after colectomies and specifically after Low Anterior Resection (LAR). However there has been little research on the efficacy of the addition of preoperative carbohydrate loading to an ERAS pathway after robotic assisted LAR. Here we compare short term outcomes before and after the addition of carbohydrate loading to an ERAS pathway in the setting of robotic assisted LAR.

**Methods/Interventions:** Current Procedural Technology (CPT) codes were used to identify all patients undergoing robotic assisted LAR for rectal cancer at

our center from September 2011 to September 2016. Clinical, operative and post-operative complication data was collected by review of the electronic medical record. Primary outcomes of interest were length of stay, post-operative complications and readmissions. Complications were graded according to the Clavien-Dindo classification. Complications of interest included wound infection, ileus/small bowel obstruction, bleeding, and anastomotic leak. The addition of carbohydrate loading to our ERAS pathway was initiated in November of 2015, splitting the cohort in to two groups for comparison. Carbohydrate loading consisted of Clear-Fast carbohydrate drink the night before surgery and clear liquids up to 3 hours prior to surgery. T-tests and Fisher's Exact tests were performed where appropriate. All statistical analyses were performed using SAS/STAT software.

**Results/Outcome(s):** 127 patients were included in this study. 102 patients did not undergo preoperative carbohydrate loading, while the remaining 25 received carbohydrate loading. There were no significant differences between groups with regard to preoperative clinical characteristics, including age, gender, BMI, tumor height, preoperative chemo-radiation therapy, ASA class or comorbidities. The average length of stay for no carbohydrate loading was 4.49 days compared to 4.52 days for the carbohydrate loading group and this was not statistically significant. Furthermore, there were no significant differences with regard to overall complication rate, or any of the pre-determined complications of interest.

**Conclusions/Discussion:** The addition of carbohydrate loading to an ERAS pathway does not significantly decrease length of stay or shorten time to return of bowel function. Furthermore, it does not seem to affect post-operative complications. Limitations of this study include its retrospective nature. Furthermore, these are preliminary results that will be expanded upon with the addition of more patients in the future.

P242 Table 1

	Without Carbohydrate-load	With Carbohydrate-load	p value
Length of Stay d (s.d.)	4.49 (2.9)	4.52 (3.3)	0.96
Conversion to Open n (%)	6 (5.9)	1 (4)	1
Surgical Site Infection n (%)	4 (3.9)	0 (0)	0.58
Ileus n (%)	9 (8.8)	1 (4)	0.68
Bleeding n (%)	3 (2.94)	2 (8)	0.25
Anastomotic Leak n (%)	2 (1.96)	0 (0)	1
30 Day Readmission n (%)	6 (5.9)	3 (12)	0.38
Complication Rate n (%)	19 (18.6)	8 (32)	0.17

## RE-RECURRENT RECTAL PROLAPSE – IS THERE A BETTER APPROACH?

P243

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**Purpose/Background:** Despite new advances in surgery for rectal prolapse, recurrence remains a continuing problem. Given the lack of clear pathophysiology regarding why recurrences occur, there is no solid data regarding which operations should be considered for a repeat attempt. Our aim was to analyze all recurrent rectal prolapse operations to clarify the optimal decision making pathway.

**Methods/Interventions:** We retrospectively identified 421 patients from a single institution who underwent repair for rectal prolapse operations over a 13-year period. Cases were classified based on surgical approach (abdominal – [laparoscopic or open] and perineal) and number of recurrences. Follow-up data were recorded from the electronic medical record.

**Results/Outcome(s):** From the entire cohort there was a 12.4% recurrence rate (52 of 421) at an average of 4 four years from surgery. Of the recurrences, the majority (73%, n=45) were first repaired via a perineal approach. In terms of repeat operations 37/62 (59.7%) were repaired via a perineal approach and 25 via an abdominal approach (5 open, 20 laparoscopic). Second time recurrences occurred in 14/52 (27%) at an average of 3.4 years from the initial surgery. The recurrence rate was significantly higher when the second operation was done via a perineal approach vs. an abdominal approach (85.7% vs. 50.0%,  $p = 0.020$ ). Among all who recurred once, those who recurred a second time vs. those who did not recur were similar in age ( $75.7 \pm 17.0$  vs.  $78.0 \pm 16.6$ , respectively;  $p = 0.668$ ) and in the Charlson comorbidity index ( $5.5 + 1.3$  vs.  $6.1 + 1.4$ , respectively;  $p = 0.197$ ).

**Conclusions/Discussion:** In this single institution review, second time operations for recurrent prolapse are associated with higher recurrence rates when compared to the index operation. Perineal approaches done for recurrent prolapse were associated with higher re-recurrence rates compared to abdominal operations. However, age and comorbidities were not associated with re-recurrent rectal prolapse.

## VALIDATION OF A PREOPERATIVE, PROGNOSTIC MODEL FOR PREDICTION OF MORBIDITY DURING PELVIC DISSECTION.

P244

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**Purpose/Background:** The anatomic confines of the pelvis pose technical challenges during deep pelvic dissection cases. We previously developed a 'Pelvic Surgery Difficulty Index' (PSDI) and demonstrated that higher PSDI scores were associated with worse outcomes. We aimed to validate the ability of this model to preoperatively predict a difficult deep pelvic dissection, its associated morbidity and outcomes in a larger patient population.

**Methods/Interventions:** Patients who underwent a deep pelvic dissection (low anterior resection, abdominoperineal resection or rectopexy) from 2009 to 2016 at the University of Florida were included in this IRB-approved study. The 'Pelvic Surgery Difficulty Index' (PSDI) consisted of 3 factors: male sex, history of pelvic radiation and length from sacral promontory to pelvic floor  $>130$  mm with a score of 1 attributed to each factor. 'Velocity' software was used to obtain 16 pelvic measurements from preoperative CT scans on all patients. Outcomes and costs were compared in patients stratified by the composite score from the PSDI model, which was validated with calculation of p value, sensitivity, specificity, Nagelkerke  $R^2$  and Goodness of fit (Pearson and Deviance). SPSS software was used for statistical analysis.

**Results/Outcome(s):** A total of 347 patients were included with a mean follow up of 4 years. Stratification by PSDI scores revealed 25 patients (7%) with a score of 0, 143 patients (41%) with a score of 1, 120 patients (35%) with a score of 2 and 59 patients (17%) with a score of 3. Baseline characteristics were similar except for age not being equally distributed (older patients with score 0 or 3). Higher scores were associated with increased blood loss ( $p < 0.0005$ ), longer operative time ( $p = 0.015$ ), and longer hospital stay ( $p < 0.0005$ ). Patients with higher scores had higher postoperative morbidity rates ( $p = 0.002$ ) and were more likely to have autonomic nerve injury manifested by postoperative sexual problems ( $p = 0.002$ ) and short ( $p < 0.0005$ ) and long-term urinary difficulties ( $p = 0.003$ ). The PSDI model had a high sensitivity (0.95) and specificity (0.90) with goodness of fit tests (Pearson and Deviance) being insignificant, demonstrating a well-fitting model ( $p < 0.0001$ ).

**Conclusions/Discussion:** Preoperative prediction of the morbidity associated with difficult pelvic dissection is possible with a simple, objective, validated model. Higher scores are associated with increased operative time, blood loss, length of stay, morbidity and cost. Such a tool may facilitate preoperative planning, allow better



risk stratification and assessment of quality measurements across centers.

Outcome variable	PSDI Score				p value
	0	1	2	3	
Blood loss (mean ml)	228	158	300	412	<0.0005
Operative time (mean min)	218	232	251	289	0.015
Length of stay (mean days)	6.04	6.95	8.43	10.81	<0.0005
Postoperative morbidity (%)	32	40	47.9	67.9	0.002
Total hospital costs (\$)	13,443.95	22,585.17	21,748.20	30,442.69	0.06

### EVALUATING THE IMPACT OF A STANDARDIZED DISCHARGE CHECKLIST ON READMISSION RATES AFTER COLON AND RECTAL SURGERY.

P245

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**Purpose/Background:** Hospital readmission is increasingly being used as a performance marker within colon and rectal surgery. C-Reactive Protein (CRP) has been studied as an indicator for infectious complication, but has not been used for evaluation for discharge as part of a 'discharge criteria checklist.' We created a multi-component discharge checklist (including threshold CRP values) to guide the discharging team with the goal to impact readmission rates after colon and rectal surgery. We also investigated which patient related factors, if any, are predictors for readmission.

**Methods/Interventions:** A 7 component discharge checklist was instituted on September 1 2015 for all patients who underwent colon and rectal surgery requiring >1 day admission performed by a single group of colorectal surgeons. A discharge CRP threshold was adjusted for each post-operative day 2-5 (172, 172, 124, and 144 mg/L, respectively), based on previous literature review values. We used an analogous set of data from 12 months prior as a control group. Univariate and multivariate analyses were used to identify patient related, pre- and peri-operative risk factors associated with 30-day readmission. The primary outcome measure was both emergency room and inpatient readmission at 30 days post-operatively.

**Results/Outcome(s):** The study included a total of 1546 patients. Surgical indications were inflammatory bowel disease (15%), colorectal cancer (24%), and benign disease (60%); 9.5% were emergencies. The readmission rates for each group were similar, 7.2% and 7.3%, for the control and discharge checklist groups, respectively. There was no association between (neither emergency room nor inpatient) readmissions and using the discharge checklist ( $p=0.88$ ). On multivariate analysis of the discharge checklist group dataset, only age (OR 0.983, 95% CI 0.971

-0.994) and operating time (1.003, 95%CI 1.001-1.005) were statistically significant as risk factors. Other patient factors, including a CRP level measured on the day of discharge, were not found to be risk factors for readmission. The difference of median CRP values on the day of discharge of those readmitted compared to those not readmitted (35 vs 32 mg/L) was not statistically significant ( $p=0.28$ ).

**Conclusions/Discussion:** The institution of a 'discharge checklist' did not impact post-operative hospital readmissions. Not only were readmissions unchanged by the use of a CRP threshold at discharge, but CRP levels at the time of discharge were not associated with readmissions. Age and operating time were weak predictors for readmission.

### ROBOTIC COLORECTAL SURGERY COUPLED WITH AN ENHANCED RECOVERY PROTOCOL LEADS TO DECREASED LENGTH OF STAY.

P246

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**Purpose/Background:** Enhanced recovery after surgery (ERAS) is a peri-operative pathway designed to achieve early recovery by blunting the body's stress response to surgery. The application of robotic surgery is gaining acceptance as an alternative minimally invasive approach to colorectal resection. More recently, the implementation of ERAS pathways has decreased length of stay in colorectal surgery. The aim of this study was to compare the combination of robotic colorectal resection with an ERAS (R-ERAS) protocol to laparoscopic (L-ERAS) and open resections (O-ERAS) with the same ERAS protocol and delineate any benefits.

**Methods/Interventions:** We performed a retrospective review of 174 elective colorectal resections from May 2015 through November 2016 from a single surgeon at our institution (robot N =63, open N=70, laparoscopic N=41). All operations were elective and all patients were part of our standardized ERAS program. We captured standard demographic variables including age and gender as well as medical co-morbidities and prior abdominal operations. We tracked length of stay (LOS), 30 day readmissions, and post-operative complications including (superficial surgical site infection (SSI), deep wound infection (DI), organ space infection (OSI), anastomotic leak, DVT/PE, and bleeding requiring transfusion (BRT). Fischer's exact tests were used for analysis of categorical outcomes after surgery and Mann-Whitney-U tests were applied for analysis of length of stay.

**Results/Outcome(s):** The median LOS for (R-ERAS=3 days, L-ERAS=4 days, O-ERAS=4 days). The difference in LOS was significant between both R-ERAS vs.L-ERAS ( $p<0.01$ ) as well as for R-ERAS vs O-ERAS ( $p<0.01$ ).

The mean LOS for each group was R-ERAS=3.46 days, L-ERAS=4.61 days, O-ERAS=7.5 days). In the R-ERAS group, there was only one infectious complication (1/63=1.59%), in the L-ERAS group there were five (5/41=12.2%) and in the O-ERAS group there were five (5/70=7.14%). There was no statistical significance in infectious complications across these groups (p=0.085). Readmissions varied from R-ERAS (5/63=7.9%), L-ERAS (2/41=4.9%), and O-ERAS (9/70=12.9%), and once again there was no statistical significance (p=0.375). Moreover, there was no difference in DVT/PE, anastomotic leak or bleeding requiring a transfusion (see table).

**Conclusions/Discussion:** Robotic surgery in conjunction with an ERAS protocol leads to decreased length of stay but no significant differences in complications or readmissions. Further study in a multi-institution randomized controlled trial would be beneficial to confirm these findings and illuminate potential synergy between minimally invasive surgical techniques when combined with an enhanced recovery protocol.

**A MODIFIED FRAILTY INDEX PREDICTS ADVERSE OUTCOMES AMONG PATIENTS WITH COLON CANCER UNDERGOING SURGICAL INTERVENTION.**

P247

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**Purpose/Background:** Assessing outcomes in patients with colon cancer (CC) undergoing surgical intervention is challenging. Frailty has been as established tool for assessing patient outcomes. The aim was of this study was to assess role of frailty in patients with CC. We

hypothesized that modified frailty index (mFI) predicts adverse outcomes in patients with CC.

**Methods/Interventions:** National estimates for patients with CC were abstracted from the National Inpatient Sample (NIS) database (2011). Frailty was calculated using a 11 variable mFI. Patient was stratified as frail (FL) (mFI≥0.25) and non-frail (Non-FL). Outcome measures were: in-hospital complications, hospital and intensive care unit (ICU) length of stay (LOS), discharge disposition, and mortality. Regression analysis was performed to assess for independent factors associated with outcomes.

**Results/Outcome(s):** A total of 53,652 patients with CC who underwent surgery were analyzed. The mean age was 69.4±18.6 years with 61% males and mean mFI being 0.23±0.17. 34% of patients were frail. 19% patients had in-hospital complications and mortality rate was 4%. Frail patients were more likely to have in-hospital complications (p=0.031), longer hospital LOS (p=0.037), more likely to be discharged to a facility (p=0.029), and trend towards higher mortality rate (p=0.091). On regression analysis after controlling for age, gender, type of procedure, hospital status, insurance status, frail status was independently associated with in-hospital complications (OR[95% CI]: 1.8[1.1-2.9], p=0.035) and adverse discharge disposition (OR[95% CI]: 1.3[1.08-3.5], p=0.043). There was poor correlation between age and frailty score (R=0.58)

**Conclusions/Discussion:** Frailty status is an independent predictor of adverse outcomes (complications, discharge disposition, and LOS) in CC patient undergoing surgical intervention. Age was not independently associated with outcome and had poor correlation with frailty status. Pre-operative assessment of frailty in CC patient may help early identifications and risk stratification to help improve outcomes and discharge planning.

**P246 Comparative Outcomes of Colorectal Resection**

	Median LOS (days)	Mean LOS (days)	30-Day Readmission	Superficial Wound Infection	Deep Wound Infection	Organ Space Infection	Total SSI	DVT/PE	Anastomotic Leak	Bleed Req. Transfusion
Open (n=70)	4	7.5	9 (12.9%)	3 (4.3%)	1 (1.4%)	1 (1.4%)	5 (7.1%)	2 (2.9%)	1 (1.4%)	6 (8.6%)
Laparoscopic (n=41)	4	4.6	2 (4.9%)	1 (2.4%)	0	4 (9.8%)	5 (12.2%)	0	1 (2.4%)	1 (2.4%)
Robotic (n=63)	3	3.5	5 (7.9%)	0	0	1 (1.6%)	1 (1.6%)	0	1 (1.6%)	3 (4.8%)
	<0.01		0.375	0.284	1	0.054	0.085	0.345	1	0.457
p-value	open vs. robotic	<0.01	lap vs. robotic							

## DISTAL STUMP LEAKS FOLLOWING A HARTMANN PROCEDURE: AN ACS-NSQIP STUDY OF RISKS AND OUTCOMES.

P248

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**Purpose/Background:** Hartmann's procedure is often performed when a colorectal anastomosis is prohibitive due to high risk of anastomotic leak. However, the closed distal segment may be prone to dehiscence and leakage, which may be associated with significant morbidity and death. To date, only small retrospective series have addressed the rate and outcomes of this complication.

**Methods/Interventions:** After institutional review board approval, patients who had undergone a Hartmann's procedure were identified from the general and colectomy specific American College of Surgeons National Surgical Quality Improvement Program databases from 2012-2015 based on CPT codes 44143 (open) and 44206 (laparoscopic). Distal stump leak was defined as an organ space surgical site infection or an anastomotic leak following a Hartmann's procedure. Patients who underwent other simultaneous procedures were excluded, as were patients who had dirty/infected wounds, organ space surgical site infections or deep surgical site infections prior to surgery. Pre and peri-operative variables were assessed using univariate analyses and binomial models were used to identify independent predictors of distal stump leaks. Secondary post-operative outcomes were analyzed using the same methods.

**Results/Outcome(s):** Of 2349 patients, 96 (4.1%) had a distal stump leak. The mean age of the cohort was 66 ( $\pm 15$ ) years and 50.3% were male. The most common indications were acute diverticulitis (15.5%), colon cancer (18.1%), colon cancer with obstruction (14.4%), and diverticular disease (10%). There were no significant differences in age, sex, race, comorbidities and indication for surgery between both groups. Multivariate analysis demonstrated longer operative time [OR 1.003 (95% CI 1.001-1.006)] and contaminated wounds [OR 1.67 (95% CI 1.01-2.74)] were predictive of distal stump leaks, while medically treated hypertension was protective [OR 0.557 (95%CI 0.326-0.941)]. On univariate analyses, patients with distal stump leaks had significantly increased rates of ileus (46% vs. 21%,  $p < 0.001$ ), reoperation (37% vs. 6%,  $p < 0.0001$ ), readmission (32% vs. 9%,  $p < 0.0001$ ), failure to wean off ventilator (19% vs. 5%  $p < .0001$ ), systemic sepsis (30% vs. 4%,  $p < .0001$ ) and death (26% vs. 8%,  $p < 0.0001$ ). Multivariate analyses showed that distal stump leak was a significant predictor of death within 30 days [OR 3.61 (95%CI 1.52 - 8.59)], reoperation [OR 7.32 (95%CI 4.15-12.91)], readmission [OR 5.76 (95%CI 3.42 - 9.72)], and post-operative ileus [OR 2.12 (95%CI 1.27 - 3.53)].

**Conclusions/Discussion:** In this large, multicenter database, the observed rate of distal stump leak following a Hartmann's procedure was 4%. Increased operative time and contaminated wounds were independent predictors of distal stump leaks. Patients who experienced a distal stump leak suffered significant morbidity and increased risk of death.

## RIGHT-SIDED COLECTOMIES FOR DIVERTICULITIS HAVE WORSE OUTCOMES COMPARED TO LEFT-SIDED COLECTOMIES FOR DIVERTICULITIS: AN ACS NSQIP ANALYSIS OF PREDICTORS AND OUTCOMES.

P249

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**Purpose/Background:** Right- and left-sided diverticulitis have similar clinical presentations. However, there are limited and conflicting data on the surgical outcomes following resection for right-sided compared to left-sided diverticulitis. The aim of this study was to compare outcomes of colectomies for right- and left-sided diverticulitis.

**Methods/Interventions:** After institutional review board approval, all cases of right- and left-sided colectomy for diverticulitis were identified from the American College of Surgeons National Surgical Quality Improvement Program database from 2005-2015. Demographics, comorbidities, and postoperative outcomes were identified and compared for right- and left-sided colectomies. Predictors of the pre-defined outcomes were analyzed by multivariate regression.

**Results/Outcome(s):** Of 50,588 patients identified, 710 underwent a right-sided colectomy for diverticulitis and 49,878 underwent a left-sided colectomy for diverticulitis. Right-sided colectomy for diverticulitis was associated with younger mean age (55.98 ( $\pm 14.68$ ) vs. 58.50 ( $\pm 13.00$ ),  $p < 0.01$ ) and Asian origin (3.66% vs. 0.84%,  $p < 0.01$ ). On univariate analysis, right-sided colectomies were more likely to be performed in an emergency setting (23.66% vs. 15.80%,  $p < 0.01$ ) and less likely to have a stoma (3.38% vs. 24.91%,  $p < 0.01$ ). Furthermore, right-sided colectomies were associated with higher rates of anastomotic leak (6.36% vs. 3.16%,  $p < 0.01$ ), reoperation (7.18% vs. 4.80%,  $p < 0.01$ ), and increased length of stay (median [IQR] 6 [4,10] vs. 5 [4, 8] days,  $p < 0.01$ ), without any differences in overall 30-day major morbidity (19.44 vs. 16.77,  $p = 0.06$ ) or mortality (1.83% vs. 1.30%,  $p = 0.24$ ). On multivariate analysis after adjusting for emergency setting, ASA, immunosuppression, and sepsis amongst other confounders, right-sided colectomy was a predictor of anastomotic leak (OR 2.04, 95%CI 1.13-3.68), major morbidity (OR 1.31, 95%CI 1.06-1.63) and increased length of stay (0.19 days,

95%CI 0.15-0.24). Emergency surgery was also a predictor for major morbidity (OR 1.42, 95%CI 1.53-2.66) for both right and left-sided colectomies, while increased age, ASA of 4 or 5, congestive heart failure, immunosuppression, contaminated/dirty wounds, and pre-operative sepsis were predictors of mortality. Type of colectomy (right vs. left-sided) was not a predictor of mortality.

**Conclusions/Discussion:** Right-sided colectomies are more likely to be performed emergently compared to left-sided colectomies for diverticulitis, and are associated with significantly greater rates of major morbidity, anastomotic leak and reoperation.

**RISK FACTORS FOR READMISSION AFTER ILEOSTOMY CREATION IN NSQIP DATABASE.**

P250

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**Purpose/Background:** Ileostomy creation is associated with excess readmissions following colorectal surgery. We sought to identify factors associated with readmission following creation of an ileostomy.

**Methods/Interventions:** We used the NSQIP dataset and included 27,213 patients who underwent ileostomy between 2012 and 2014. We conducted univariate and multivariable analysis to identify predictors of surgery-related 30-day readmissions. As appropriate, two-sided chi-square tests were used for categorical variables and t-tests for continuous variables. We created a multivariable logistic regression models that included variables with sufficient sample sizes. Odds ratios and 95% confidence intervals (95% CI) were calculated. Our model included surgery type (total abdominal colectomy, partial colectomy, or pelvic dissection), age, gender, race/ethnicity, functional status, diabetes, pulmonary, cardiovascular and renal diagnosis, steroid use, ventilator dependence, ascites, disseminated cancer, weight loss, bleeding disorders, emergency case, ASA class, superficial, deep incisional and organ/space SSI, wound disruption, occurrence of pneumonia, acute renal failure and sepsis, and return to OR.

**Results/Outcome(s):** 22767 patients (16%) with new ileostomies were readmitted within 30 days. Patients who had partial colectomies were less likely to be readmitted than patients who had a total abdominal colectomy or a pelvic procedure (OR 0.61; CI 0.52, 0.70). Factors associated with readmission were organ space SSI (OR 5.59; 95% CI 4.66, 6.71), deep incisional SSI (OR 3.61; CI 2.67, 4.89), superficial infection (OR 2.59; CI 2.17, 3.08), return to the OR (OR 2.35; CI 1.94, 2.85), sepsis (OR 1.94; CI 1.61, 2.34), high ASA class (OR 1.81; CI 0.78, 4.20). Wound disruption, pneumonia, and disseminated cancer were also associated with readmission. (Table 1)

**Conclusions/Discussion:** Readmission rates are high in patients undergoing ileostomy creation. The reasons for

readmission are complex and involve preoperative patient characteristics and postoperative complications. Efforts to reduce readmission should focus on patients undergoing concomitant pelvic procedures as well as avoidance and management of common post-operative complications in this group of patients.

Table 1: Pre-operative, Post operative factors for Readmission in Ileostomy Creation

Groups	Total	%	No Readmission (n)	% row	Readmission (n)	% row	OR (95% CI)	p	
Procedure-related Readmissions	27213		22767	83.7%	4446	16.3%			
Ileostomy Groups	4255	15.6%	3239	76.1%	1016	23.9%	ref		
Total colectomy	3684	14.2%	2882	78.0%	782	20.2%	0.96(0.85, 1.13)	<0.0001	
Partial	3094	11.4%	2446	79.1%	648	21.0%	0.61(0.52, 0.71)		
Age in Categories	18-39	4407	16.2%	3413	77.4%	994	22.6%	ref	
40-59	6227	22.9%	4836	77.7%	1391	22.3%	0.89(0.80, 0.99)	<0.0001	
60-79	11113	40.8%	8456	75.9%	2657	24.1%	0.87(0.80, 0.95)		
80+	3455	12.7%	2691	77.9%	764	22.1%	0.59(0.48, 0.74)		
Gender	Female	14292	52.5%	11960	83.7%	2332	16.3%	ref	
Male	12921	47.5%	10807	83.6%	2114	16.4%	0.80(0.72, 0.89)	<0.0001	
Race/Ethnicity	Non-Hispanic White	19566	71.9%	16723	85.3%	3273	16.7%	ref	
Non-Hispanic Black	2610	9.6%	2167	83.0%	443	17.0%	1.14(0.91, 1.44)	0.386	
Not-Hispanic Unknown	444	1.6%	369	83.1%	75	16.9%	1.34(0.71, 2.51)		
Hispanic	1054	3.9%	851	80.7%	203	19.3%	1.11(0.88, 1.40)		
Other	598	2.2%	509	85.1%	89	14.9%	0.84(0.61, 1.17)		
Functional health status Prior to Surgery	Independent	25621	94.1%	21528	83.6%	4093	15.9%	ref	
Partially Dependent	967	3.6%	859	88.8%	108	11.2%	0.85(0.65, 1.12)	0.5007	
Totally Dependent	289	1.1%	245	84.8%	44	15.2%	0.93(0.55, 1.58)		
Diabetes mellitus with oral agents or insulin	Non Diabetic	32133	85.0%	19392	60.3%	12741	39.7%	ref	
Insulin Dependent	1670	6.1%	1368	81.9%	302	18.1%	1.18(0.97, 1.46)	0.2492	
Non Insulin dependent	2410	8.9%	2042	84.7%	368	15.3%	1.00(0.83, 1.21)		
Pulmonary Diagnosis	Yes	2459	9.0%	2184	88.8%	275	11.2%	ref	
No	24754	91.0%	20583	83.2%	4171	16.8%	1.26(0.79, 2.00)	0.3302	
Cardiovascular Diagnosis	Yes	2617	9.6%	2341	89.4%	276	10.6%	ref	
No	24596	90.4%	20426	83.1%	4170	16.9%	1.29(0.83, 2.00)	0.2394	
Renal Diagnosis	Yes	2655	9.7%	2219	83.6%	436	16.4%	ref	
No	24558	90.3%	20548	83.7%	4010	16.3%	0.78(0.61, 1.23)	0.2825	
Steroid use for chronic condition	Yes	4650	17.1%	3656	78.6%	994	21.4%	1.20(1.04, 1.38)	0.01
No	22563	82.9%	19111	84.7%	3452	15.3%	ref		
Ventilator Dependent	Yes	450	1.6%	400	88.9%	50	11.1%	ref	
No	26763	98.4%	22367	83.6%	4396	16.4%	0.71(0.48, 1.05)	0.0846	
Ascites	Yes	3533	12.9%	3132	88.7%	401	11.3%	ref	
No	1860	6.8%	1535	82.5%	325	17.5%	1.25(1.04, 1.50)	0.0154	
Disseminated Cancer	Yes	1628	6.0%	1351	82.9%	277	17.1%	1.15(0.84, 1.60)	0.6075
No	25685	94.0%	21416	83.4%	4269	16.6%	ref		
Weight loss in last 6 months > 10%	Yes	1704	6.3%	1426	83.7%	278	16.3%	0.95(0.78, 1.16)	0.1648
No	25509	93.7%	21341	83.7%	4168	16.3%	ref		
Bleeding Disorders	Yes	1628	6.0%	1351	82.9%	277	17.1%	1.15(0.84, 1.60)	0.6075
No	25685	94.0%	21416	83.4%	4269	16.6%	ref		
Emergency case	Yes	4684	17.2%	4025	85.9%	659	14.1%	0.96(0.82, 1.13)	0.626
No	22529	82.8%	18742	83.2%	3787	16.8%	ref		
ASA classification	No Disturb	10771	39.6%	9012	83.7%	1759	16.3%	1.48(0.93, 2.34)	0.0009
Mild Disturb	12616	46.4%	10427	82.6%	2189	17.4%	1.92(1.57, 2.34)		
Severe Disturb	2914	10.7%	2509	86.0%	409	14.0%	1.84(1.50, 2.25)		
None assigned	280	1.0%	257	91.8%	23	8.2%	1.81(0.78, 4.20)		
Superficial Infection	Yes	25414	93.4%	21488	84.6%	3926	15.4%	ref	
No	1799	6.6%	1276	71.1%	523	29.1%	2.92(2.17, 3.98)	<0.0001	
Superficial Incisional SSI	Yes	27146	99.8%	22721	83.7%	4425	16.3%	ref	
No	45	0.2%	44	97.8%	1	2.2%	1.22(0.28, 5.48)	0.6059	
Deep Incisional SSI	Yes	36687	135%	22487	61.3%	14200	38.7%	ref	
No	23546	86.6%	200	0.8%	23466	100%	3.61(2.67, 4.89)	<0.0001	
Organ Space SSI	Yes	1763	6.5%	835	47.4%	928	52.6%	5.59(4.66, 6.71)	<0.0001
No	25450	93.5%	22504	88.4%	2946	11.6%	ref		
Wound Disruption	Yes	1043	3.8%	844	80.9%	199	19.1%	1.66(1.29, 2.15)	0.0013
No	26170	96.2%	21923	83.8%	4247	16.2%	ref		
Pneumonia Occurrences	Yes	26599	97.7%	22517	84.7%	4082	15.3%	ref	
No	314	1.2%	250	79.6%	64	20.4%	0.80(0.41, 1.52)	0.132	
Acute Renal Failure Occurrences	Yes	25481	93.6%	21742	85.3%	3739	14.7%	ref	
No	1732	6.4%	1623	93.7%	109	6.3%	1.94(1.50, 2.54)	0.0001	
Return to OR	Yes	35904	131%	31635	88.1%	4269	14.7%	ref	
No	1849	6.8%	1132	61.2%	717	38.8%	2.35(1.94, 2.85)	<0.0001	

**OUTCOMES AND RESOURCE UTILIZATION IN MEDICALLY UNDERSERVED PATIENTS WITH ACUTE DIVERTICULITIS UNDERGOING SURGERY.**

P252

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**Purpose/Background:** Medically underserved patients, including patients from racial and ethnic minorities and uninsured patients, with acute diverticulitis have worsened outcomes. However, it is unknown what patient and system factors contribute to these disparities. We hypothesized that among a medically underserved patient population, need for emergency surgery is the primary predictor of postoperative complications and is not associated with race or insurance status.

**Methods/Interventions:** A retrospective cohort study was conducted on all patients undergoing surgery for diverticulitis from 2011 to 2015 at a large safety-net hospital. Demographic data and patient comorbidities were recorded. Preoperative resource utilization was assessed, severity of disease on admission was denoted by CT assigned Hinchey Classification, and outcomes were length

of stay, postoperative complications, reoperation, and readmission. Univariate and multivariable analyses were performed to identify predictors of surgical complications.

**Results/Outcome(s):** One hundred patients received surgery of which 58 (58%) underwent an emergent procedure. There were no differences in age, body mass index (BMI), race/ethnicity, sex, or insurance status between the two groups, while the emergent group had higher American Society of Anesthesiology (ASA) scores on admission ( $p=0.03$ ). In terms of resource utilization, elective surgery patients showed higher numbers of diverticulitis episodes (mean 2.38 vs. 1.57,  $p<0.01$ ), ED visits (2.50 vs. 1.55,  $p<0.01$ ), clinic visits (1.67 vs. 0.43,  $p<0.01$ ), and hospitalizations (2.07 vs. 1.41,  $p<0.01$ ). Patients undergoing emergency surgery were more likely to present with increased severity based on CT Hinchey of 3 or higher (32% vs 0%,  $p<0.01$ ). They were also more likely to have at least one complication (43% vs 24%,  $p=0.06$ ), to receive a reoperation (24% vs 2%,  $p<0.01$ ), and to receive an ostomy (83% vs. 26%),  $p<0.01$ ). A multivariable logistic regression analysis showed that the presence of systemic inflammatory response syndrome (SIRS) on admission (OR 2.67, 95% CI 1.09-6.48,  $p=0.03$ ) and ostomy formation (OR 3.11, 95% CI 1.20-8.05,  $p=0.02$ ) were significantly associated with increased rate of postoperative surgical complications.

**Conclusions/Discussion:** Patients with acute diverticulitis requiring elective surgical intervention impose a significant burden on resource utilization. Race or ethnicity, sex, and insurance status are not associated with outcome amongst those undergoing surgical intervention, while the severity of disease on presentation is associated. Opportunities may exist to improve outcomes by avoiding emergency operation on patients with known complicated disease.

#### GETTING TO THE BOTTOM OF TREATMENT OF RECTAL PROLAPSE IN THE ELDERLY: ANALYSIS OF THE NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM.

P253

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**Purpose/Background:** Rectal prolapse is a common debilitating condition in the elderly. A variety of surgical approaches to treat it exists, yet little is known regarding their safety in older populations. The study aim was to evaluate morbidity, mortality, and temporal trends of open(OP), laparoscopic(LP), and perineal(PR) approaches for rectal prolapse repair in the U.S. elderly using a contemporary, national dataset.

**Methods/Interventions:** NSQIP was queried to identify patients 70 yrs. and older who underwent abdominal(OP and LP) rectopexy and PR rectosigmoidectomy

for rectal prolapse from 2008-2014. Patients were then selected using NSQIP's estimated probability of morbidity of 50<sup>th</sup> percentile or higher. Primary outcomes were 30-day mortality and a composite of major complications:30-day mortality, septic shock and surgical site infections(SSI) limited to organ space abscess and fascial dehiscence. Secondary outcomes were major and minor postoperative complications. Univariate and multivariate regression analyses were performed. Subgroup analyses of patients 70-79 yrs.old and 80-89 yrs.old were performed. Temporal trends were analyzed.

**Results/Outcome(s):** Overall, 1361 patients 70 yrs. and older underwent OP(18.4%), LP(14.8%) and PR(66.9%) approaches. Although abdominal approaches had longer operative times(OP  $104 \pm 58$  min. vs. LP  $131 \pm 64$  min. vs. PR  $87 \pm 43$  min; $P=<0.0001$ ) and minor complication rate of superficial and deep wound infections(OP 4.0 % vs. LP 1.0% vs. PR 0.4%; $P= 0.0002$ ), there were no significant differences in any major complications rates(SSI limited to organ space abscess and fascial dehiscence, septic shock, reoperation in 30 days). Subgroup analyses in patients 70-79 yrs. and 80-89 yrs. also demonstrated no significant differences in major complications rates. The overall rate of mortality was 1.8%, and the 3 groups had similar rates of 30-day mortality(OP 0.8% vs. LP 1.0% vs. PR 2.3%; $P= 0.26$ ). After adjustment of other factors, composite mortality, septic shock, and SSI limited to organ space abscess and fascial dehiscence was significantly associated with perineal approach [odds ratio(OR) 2.5, 95% confidence interval(CI), 1.13, 5.72] and not associated with older age [(OR) 1.3, (CI) 0.7, 2.4]. From 2008 to 2014, OP approaches decreased from 14.0% to 9.2%; LP increased from 10.7% to 19.0%; and PR decreased from 75.3% to 71.9% among all 70 yrs. and older.

**Conclusions/Discussion:** PR rectosigmoidectomy remains the predominant surgical approach for rectal prolapse in the elderly, yet, LP approaches appear to have increased in the last decade. Both abdominal and PR approaches carry acceptably low rates of mortality and major complications with no association to older age;yet as the U.S. population ages in a minimally invasive era, PR rectosigmoidectomy is associated with a higher likelihood of mortality and major complications compared to abdominal approaches in the sickest elderly population.

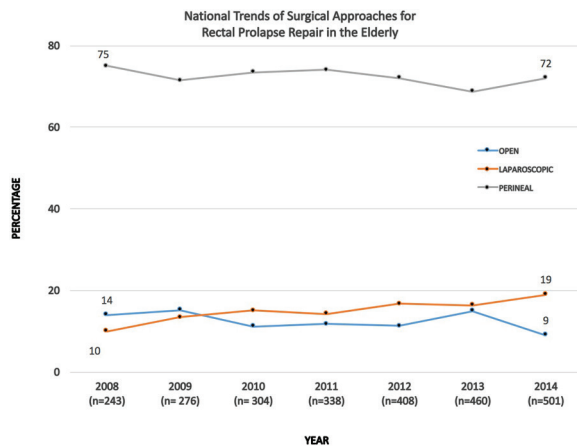


Figure I. National trends of surgical approaches for rectal prolapse in patients 70 years and older from 2008-2014.

## FUNCTIONAL OUTCOMES FOLLOWING SACRECTOMY.

P254

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**Purpose/Background:** En bloc sacrectomy for locally advanced cancers of the pelvis is a complex procedure that can be associated with considerable long term functional complications depending on the number and level of sacral nerve roots that have to be sacrificed for oncological reasons. Functional sequelae after sacrectomy is not well documented and few studies have compared functional outcomes between patients with high or low sacrectomy which is usually arbitrarily defined as S1/S2 resection or resection of S3 and caudal sacral segments respectively.

**Methods/Interventions:** This is a cross sectional study investigating functional outcomes in patients who underwent en bloc sacrectomy at a single quaternary referral centre as part of a pelvic exenteration for an advanced pelvic cancer with curative intent from 2008 to 2015. Eligible patients were identified from a prospectively maintained exenteration database. The primary outcomes of interest, measured using previously validated questionnaires, included lower limb motor function (Revised Musculoskeletal Tumour Scale – MSTS), bowel and bladder (European Organisation for Research and Treatment of Cancer – EORTC – Colorectal cancer questionnaire – QLQ-CR29) and as well as quality of life (EORTC Quality of Life questionnaire – QLQ-C30). All questionnaires were scored according to the respective scoring manuals.

**Results/Outcome(s):** There were 55 eligible patients who underwent an en bloc sacrectomy during the study period. To date, 23 responses have been received with 14 males (61%) and 9 females (39%). The mean age was 63 years (SD 13). Six patients (26%) underwent high

sacrectomy and 17 (74%) low sacrectomy. Indications for sacrectomy were advanced primary rectal cancers (N=6; 26%), locally recurrent rectal cancer (N=10; 44%), non-rectal advanced cancers (N=7; 30%). The median time between surgery and data collection was 25 months (range 7 – 65). High sacrectomy when compared to low sacrectomy had worse lower limb motor function (Mean  $\pm$  SD, High  $56.7 \pm 27.5$  vs Low  $78.2 \pm 19.8$ ;  $P=0.05$ ), bowel function (High  $72.2 \pm 18.3$  vs Low  $76.5 \pm 17.3$ ;  $P=0.62$ ), bladder function (High  $75.7 \pm 14.3$  vs Low  $80.4 \pm 12.2$ ;  $P=0.45$ ), and QoL (High  $67.5 \pm 15.6$  vs Low  $78.8 \pm 15.5$ ;  $P=0.17$ ), although the differences were not significant.

**Conclusions/Discussion:** Patients undergoing high sacrectomy presented reduced quality of life, lower limb, bladder and bowel function when compared to low sacrectomy, although the difference was not significant. The scores in both groups still demonstrate a relative high level of functioning given the invasive nature of the intervention. Larger cohort studies are needed to confirm our findings.

## IMPACT OF TRANSANAL ENDOSCOPIC MICROSURGERY ON ANORECTAL FUNCTION: A PROSPECTIVE CLINICAL, FUNCTIONAL AND QUALITY OF LIFE INVESTIGATION BEFORE AND AFTER SURGERY.

P255

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**Purpose/Background:** The impact of transanal endoscopic microsurgery (TEM) on anorectal function remains poorly available, particularly when considering that the technique involves undertaking full- or partial-thickness excision of the rectal wall. Moreover, in spite of wide adoption of TEM, its impact on quality of life remains unknown since most evidence derives from retrospective studies. The objectives of the present study were to evaluate the impact of TEM on sphincter function determined by clinical (Wexner score), functional (anorectal manometry), and quality of life (FIQL) evaluations conducted before and after surgery.

**Methods/Interventions:** In this prospective cohort study, 23 patients with rectal lesions underwent were operated on using the TEO® equipment (Karl Storz, Tuttlingen, Germany). Wexner and FIQL scores were obtained before and after surgery (7 days, 30 days and 90 days postoperatively). Anorectal electromanometry was obtained before surgery, and postoperatively after 30 and 90 days.

**Results/Outcome(s):** Fourteen patients were men. Mean age was 53.7 (24-81) yrs. Mean distance from the lesion to the pectinate line was 7 (2-15) cm. A full- thickness resection was undertaken in 18 (78.3%) cases. Histopathology revealed adenoma in 14 (61%),

neuroendocrine tumor in 5 (21.7%), invasive carcinoma in 3 (13%), and hyperplastic polyp in 1 (4.3%) case. Postoperative rectal wound separation occurred in 2 patients and 1 patient developed atrial fibrillation. The mean duration of postoperative follow-up was 5 (3-7) months. Overall, Wexner score significantly declined between postoperative days 7 and 30 (Wilcoxon,  $p = 0.03$ ), particularly among diabetic patients. Rectal compliance exhibited significant decline 30 days after surgery and recovery at 90 days after surgery (ANOVA,  $p = 0.05$ ), especially among patients with more distal lesions in the present study. It was not possible to measure any difference in the FIQL results before and after surgery.

**Conclusions/Discussion:** Following TEM, some clinical impact on anorectal function could be measured especially among diabetic patients. Interestingly, anorectal function impairment was not due to sphincter dysfunction, but resulted from loss of rectal compliance after surgery. Ultimately, we could not detect a significant impact on quality of life after TEM.

#### NORMAL PELVIC FLOOR ANATOMY AND MORPHOLOGY BASED ON DYNAMIC MAGNETIC RESONANCE DEFECOGRAPHY OF ASYMPTOMATIC FEMALE ADULTS: A STUDY IN 93 SUBJECTS.

P256

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**Purpose/Background:** Dynamic magnetic resonance defecography (MRD) has been widely used in the diagnosis and evaluation of pelvic floor dysfunctions. However, previous MRD studies of asymptomatic individuals have been limited by their small sample size, and the criteria for normality are still debatable. The aim of this study is to present the normal value of female pelvic floor anatomy and morphology in asymptomatic nulliparous volunteers based on MRD.

**Methods/Interventions:** **DESIGN:** Both static and dynamic MRI findings were independently evaluated by two examiners and were blinded to each other's findings. **SETTING:** The current study was conducted in the Departments of Colorectal Surgery and Radiology at the Sixth Affiliated Hospital of Sun Yat-sen University. **SUBJECTS:** Included in the study were 93 asymptomatic nonparous female volunteers ranging in age from 20 to 30 years (median age, 23.8 years) who successfully underwent pelvic MRD in supine position between May 2013 and January 2014. **MAIN OUTCOME MEASURES:** Perpendicular distances of the bladder base, uterocervical junction, and anorectal junction to pubococcygeal line (PCL) were measured. Anatomy and morphometric

measurements were also noted for the levator ani and puborectalis.

**Results/Outcome(s):** The mean position of the bladder base was located at +20.1 mm at rest and descended to +3.3 mm during defecation in relation to PCL. The mean position of the uterocervical junction was located at +35.7 mm at rest and at +13.7 mm during defecation. The mean anorectal junction is located at -4.9 mm at rest and at -22.1 mm during defecation. According to the staging system of pelvic organ prolapse, mild cystocele, uterocervical prolapse, and descending perineal syndrome were seen in 35.5% (33/93), 12.9% (12/93), and 24.7% (23/93) of asymptomatic subjects, respectively; moderate and severe pelvic organ prolapse was absent. At rest, the levator ani was basin-shaped, funnel shaped, and dome shaped from anterior to posterior; and the iliococcyus angle decreased accordingly. During defecation, the levator ani descended, and the mean iliococcyus angle increased 8.0 degrees on the anal midcoranal plane ( $P < 0.001$ ). The puborectalis was v-shaped at rest; the mean area of genital hiatus was 1,180.7 mm<sup>2</sup>. During defecation, the puborectalis relaxed and changed into U-shaped; the mean puborectalis thickness decreased bilaterally ( $P < 0.001$ ); and the mean area of genital hiatus increased 703.7 mm<sup>2</sup> ( $P < 0.001$ ).

**Conclusions/Discussion:** Dynamic MRD has the potential to show the anatomy and morphology of pelvic floor musculature. The results of this study show a larger range of pelvic organs movement in normal subjects than previous appreciated, which indicates that the criteria for pelvic floor decent need to be re-evaluated.

#### COMBINED RECTOPEXY AND SACROCOLPOPEXY IS SAFE FOR CORRECTION OF PELVIC ORGAN PROLAPSE.

P257

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**Purpose/Background:** Pelvic floor abnormalities often affect multiple organs. The incidence of concomitant uterine/vaginal prolapse with rectal prolapse is at least 38%. For these patients the addition of sacrocolpopexy to rectopexy may be appropriate. Our aim was to determine if the addition of sacrocolpopexy to rectopexy would increase the procedural morbidity over rectopexy alone.

**Methods/Interventions:** We utilized the ACS-NSQIP database to examine all female patients who underwent rectopexy from the years 2005-2014. We compared patients who had a combined procedure (sacrocolpopexy & rectopexy) to those who had rectopexy alone. Thirty-day morbidity was compared and a multivariable model constructed to determine predictors of complications.

**Results/Outcome(s):** We identified 3600 patients who underwent rectopexy. Of those, 3394 underwent rectopexy

alone while 206 underwent combined procedure with the addition of a sacrocolpopexy. There was no difference in overall morbidity between groups (14.8% rectopexy alone vs. 13.6% combined procedure,  $p=0.65$ ). Significant predictors of operative morbidity included the addition of resection to the rectopexy procedure, elevated BMI, smoking, wound class and ASA class. After controlling for these and other patient factors with multivariable regression analysis, the addition of sacrocolpopexy to rectopexy did not increase overall morbidity (OR 1.10,  $p=0.65$ ).

**Conclusions/Discussion:** There is no difference in operative morbidity when adding sacrocolpopexy to a rectopexy procedure. These findings support the practice of multidisciplinary evaluation of patients presenting with rectal prolapse, with the goal of offering concurrent surgical correction for all compartments affected by pelvic organ prolapse disorders.

#### NORMAL RANGE VALUES OF A NEW BEDSIDE MANOMETRY: ANOPRESS®.

P258

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**Purpose/Background:** Understanding the physiology of the anorectum is key to understanding patients' symptoms. Developments in testing methodology and technology have recently been made and many clinicians will now have access to high resolution and 3D manometry. Anopress® has been promoted as a new portable anal manometer providing quick, reliable and reproducible measurements of anal canal pressures during resting and squeeze states. This study aims to record the anorectal function in healthy

subjects and in patients suffering from faecal incontinence and begin to formulate normative data.

**Methods/Interventions:** Thirty healthy volunteers (HV) and 30 faecal incontinence (FI) patients underwent Anopress® using the solid state catheter provided. The maximum number of patients recruited for this study was limited by the Local Institutional Board. Resting pressure, voluntary squeeze, endurance and straining were measured in both groups and then compared.  $P < 0.05$  was considered statistically significant.

**Results/Outcome(s):** Between April 2016 and November 2016 we recruited 30 healthy volunteers (15 F and 15 M) and 30 faecal incontinence patients (25 F and 5 M). The median age was 38 (21 – 70) and 43 (18 – 52) respectively in the F and M healthy volunteers group. All the HV female were nulliparous. In the FI group the median age was 50 (21-81) and 50 (22 -77) respectively in the F and M group. Normal range of resting pressure, voluntary squeeze, endurance and strain in both HV and FI patients are demonstrated in Table 1. Comparing HV vs FI in female revealed a significant difference in measured pressures ( $P = <0.001$ ). The same difference was seen when comparing the two groups in male subjects ( $P = <0.05$ ).

**Conclusions/Discussion:** Normal range values for Anopress® have been demonstrated by this study as illustrated in the table 1. When comparing HV vs FI patients there is a significant reduction in pressures as expected. Anopress® appears to be an easy, quick and reliable way of measuring anal canal pressure. One of the main advantages is the solid state probe which is able to represent the total passive and squeeze resistance producible by the whole anal canal. Further comparisons with other standard and commonly used manometry tests are required.

#### P257 Multivariable logistic regression model for predictors of morbidity

Variable	Odds Ratio	95% Lower	95% Upper	p-value
RP vs. SCRP	1.00	0.65	1.53	0.98
Age (Numeric): 1-year increase	1.01	1.00	1.01	0.09
Resection Rectopexy	1.53	1.26	1.85	<0.001
BMI (Numeric): 1-unit increase	1.04	1.03	1.06	<0.001
Year: 2009-2011 vs. 2005-2008	0.87	0.66	1.10	0.21
Year: 2012-2014 vs. 2005-2008	0.85	0.66	1.13	0.30
Diabetes	1.11	0.78	1.56	0.60
Smoking	1.50	1.18	1.91	<0.001
COPD	1.18	0.81	1.72	0.40
Steroid Use	1.35	0.89	2.04	0.16
Bleeding Disorder	1.71	0.97	3.02	0.06
Wound Class: 3/4 vs. 1/2	1.63	1.12	2.36	0.01
ASA Class: 3/4 vs. 1/2	1.39	1.13	1.72	0.002



## INFLUENCE OF FOOT STOOL ON DEFECATION: A PROSPECTIVE STUDY.

P259

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**Purpose/Background:** We reported bending upper body forward seems to be a more efficient method for defecation than sitting straight. However, some patients complain evacuation difficulty with this position. We hypothesized that structure with foot stool facilitates defecation. This study aimed to assess the influence of foot stool on defecation.

**Methods/Interventions:** This is the prospective single group study. Patients who complain evacuation difficulty between June and October 2016 were enrolled in this study. Patients are divided into two groups who bended the upper body forward or sit straight. Cinedefecography was performed with and without foot step. Anorectal angle (ARA), *perineal plane distance* (PPD), and puborectalis length (PRL) during rest and straining in both positions were measured from the radiographs. Rectal pressure was measured with lateral position and sitting with and without foot step.

**Results/Outcome(s):** 53 patients were enrolled the study. 25 patients were female, average age of 70.2 (range: 21-90) years. There was no significant difference between with and without foot stool in ARA, PPD or PRL. In the group of bending upper body forward, the time to evacuate was significantly shorter with foot stool compared to without foot stool (123 vs 91 sec,  $p=0.04$ ). The difference of rectal pressure between lateral position and sitting position was significantly increased with foot stool compared to without foot stool (22.1 vs 16.7 mmH<sub>2</sub>O,  $p<0.01$ ). The difference of rectal pressure between with and without foot step increased in bending upper body forward compared to sitting straight (5.4 vs 1.9 mmH<sub>2</sub>O,  $p<0.01$ ).

**Conclusions/Discussion:** The foot stool seems to be a more efficient method for defecation. However, bending the upper body forward is important. This technique may be helpful when retraining patients with obstructed defecation syndrome.

## CAN ROBOTIC VENTRAL RECTOPEXY BE PERFORMED EFFICIENTLY IN THE SETTING OF RECURRENT RECTAL PROLAPSE?

P260

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**Purpose/Background:** Robotic Ventral Rectopexy (RVR) provides excellent visualization in the deep pelvis and enhanced suturing capabilities making this an ideal tool for VR. However, robotic surgery is associated with longer operative times and higher costs. Intuitively we expected that RVR would be more difficult to perform on recurrent prolapse and we questioned its role in this cohort. The aim of this study was to assess whether prior prolapse repair impacts the surgical steps of RVR and to assess the impact on procedure time.

**Methods/Interventions:** Patients undergoing RVR to treat rectal prolapse with or without associated pelvic organ prolapse between May and September of 2016 were included. We separated the patients into Group I (Primary prolapse procedure) and Group II (Prior prolapse procedure) and compared the procedure step times between groups. The procedure was broken in 7 steps: 1- port placement and exposure of the pelvis; 2- robot docking; 3- clearing the sacrum; 4- creation of peritoneal flaps and rectovaginal septum dissection; 5 - distal fixation of the graft to the rectum; 6- graft fixation to the sacrum; 7- closure of peritoneum. Each step was recorded by a dedicated research associate. Demographics and outcomes were collected in an IRB approved data registry.

**Results/Outcome(s):** Twelve female patients were included in the study, 7 patients in Group I and 5 in Group II. Prior repairs included 4 abdominal and 1 perineal procedure. There were no differences between groups regarding: Age (63 vs 61;  $p=0.68$ ), BMI (22.3 vs. 25.4,  $p=0.37$ ) and ASA. Concomitant pelvic organ prolapse procedures were similar between groups (3 vs. 2,  $p= 1.0$ ) and no conversions were observed. Table shows the timing at each procedure step. The mean docking time was slightly longer in patients undergoing primary prolapse procedure. Distal fixation of the graft, step 5, was significantly longer in patients undergoing primary repairs. Variables such as

**P258 Table 1: normal range values in a cohort of 30 healthy volunteers using Anopress© compared to 30 faecal incontinence patients.**

	Healthy Volunteers		Faecal Incontinence Group	
	Female	Male	Female	Male
Resting Pressure	51 (40 – 75)	56 (39 - 85)	23 (0 – 50)	40 (31 – 46)
Voluntary Squeeze	65 (107 – 38)	106 (39 – 165)	29 (6 – 106)	49 (21 - 99)
Endurance	75 (44 – 120)	101 (44 – 173)	30 (5 - 61)	42 (10 – 65)
Strain	45 (25 – 72)	45 (11 – 78)	18 (3 - 48)	20 (1 -55)

presence of adhesions, fixation of the uterus, and resection of the pouch of Douglas were equivalent between groups.

**Conclusions/Discussion:** RVR can be performed for both primary and recurrent rectal prolapse. In fact, distal fixation of the mesh can be performed faster in the setting of recurrent prolapse. Despite the obvious cost concerns with robotics we believe that RVR is justified for these patients.

**ROBOTIC VENTRAL MESH RECTOPEXY FOR TREATMENT OF RECTAL PROLAPSE RESULTS IN SHORTER HOSPITAL STAY WITH EQUAL EFFICACY TO POSTERIOR RECTOPEXY.**

P261

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**Purpose/Background:** Posterior suture rectopexy has been a preferred treatment for abdominal repair of rectal prolapse in the United States, whereas ventral mesh rectopexy is the first line treatment in Europe. Ventral mesh

**P260 Characteristics and procedure details of Robotic Ventral Rectopexy**

	Primary Prolapse Procedure (N = 7)	Prior Prolapse Procedure (N = 5)	p-Value
Age (median [IQR])	63.00 [51.00, 67.00]	61.00 [60.00, 74.00]	0.68
BMI (median [IQR])	22.31 [20.00, 27.36]	25.37 [23.68, 28.34]	0.37
ASA (N (%))			
2	4 (57.1%)	1 (20.0%)	0.29
3	3 (42.9%)	4 (80.0%)	0.29
Combined Cases (N (%))	3 (42.9%)	2 (40.0%)	1.00
Gynecological procedure time (median [IQR])	68.00 [64.50, 91.00]	37.50 [33.75, 41.25]	0.08
Step 1 (median [IQR])	13.00 [11.50, 15.00]	15.00 [13.00, 16.00]	0.51
Step 2 (median [IQR])	12.00 [10.50, 13.00]	7.00 [6.00, 9.00]	0.04
Step 3 (median [IQR])	6.00 [5.00, 11.50]	6.00 [5.00, 13.00]	0.93
Step 4 (median [IQR])	28.00 [21.00, 35.50]	27.00 [20.00, 33.00]	0.81
Step 5 (median [IQR])	41.00 [35.50, 54.50]	33.00 [32.00, 33.00]	0.04
Step 6 (median [IQR])	12.00 [12.00, 20.00]	9.00 [8.00, 13.00]	0.12
Step 7 (median [IQR])	25.00 [18.50, 36.00]	22.00 [18.00, 24.00]	0.69
Colorectal procedure time (median [IQR])	156.00 [138.50, 162.50]	140.00 [111.00, 162.00]	0.47
Total surgical time (median [IQR])	229.00 [187.50, 243.50]	162.00 [141.00, 185.00]	0.03
Fellow performing any Step of procedure (N (%))	2 (28.6%)	-	0.47
Uterus fixation (N (%))	5 (71.4%)	5 (100.0%)	0.47
Resection of pouch of Douglas (N (%))	1 (14.3%)	1 (20.0%)	1.00
Adhesions (N (%))	1 (14.3%)	1 (20.0%)	1.00

Time of steps and procedures reported in minutes.

rectopexy is theoretically advantageous due to the avoidance of extensive posterolateral rectal dissection, use of mesh to provide a scaffold for tissue fixation, and may be a safe operation in older more frail patients when performed with a minimally invasive approach. The purpose of this study was to evaluate the efficacy and outcomes of robotic ventral mesh rectopexy compared with posterior suture rectopexy.

**Methods/Interventions:** Retrospective demographic, operative, and follow-up data were collected on patients treated for rectal prolapse by robotic ventral mesh rectopexy and posterior rectopexy from June 2009 through July 2016 at our single institution. Ventral rectopexy involved biologic mesh fixation to the distal anterior rectum and proximally to the sacral promontory. Posterior rectopexy involved circumferential dissection with division of both lateral stalks and laparoscopic staple or suture fixation of mesorectum to sacral promontory. All ventral rectopexy cases were performed robotically, whereas posterior rectopexy cases were a mixture of robotic and standard laparoscopy. Data were analyzed with student's t-test or Fisher's exact test,  $p < 0.05$  statistically significant.

**Results/Outcome(s):** One-hundred patients were treated for rectal prolapse by either ventral mesh rectopexy ( $n=47$ ) or posterior rectopexy ( $n=53$ ) during the study period (Table). The ventral rectopexy group was older but had similar ASA scores. The ventral rectopexy group had shorter hospital stays despite operative time being longer than the posterior rectopexy group. There were two early technical failures in the ventral rectopexy group because the prolapse was not immediately repaired. There were zero mesh-related complications in the ventral rectopexy group. Follow-up time was shorter for the ventral rectopexy group because we started performing this procedure in mid-2014. Recurrence rates and times to recurrence were similar between the two groups.

**Conclusions/Discussion:** Robotic ventral mesh rectopexy has similar efficacy to posterior rectopexy as there was no difference in recurrence rates. Even though both procedures were minimally invasive, the ventral rectopexy group was older and had a shorter hospital stay. We postulate that both of these differences were due to the limited

rectal dissection in the ventral rectopexy group; first, by altering our treatment algorithm such that patients who were selected for perineal rectosigmoidectomy in the past were now being offered robotic ventral mesh rectopexy, and secondly, quicker recovery as a result of less extensive rectal dissection. We conclude that robotic ventral mesh rectopexy is a good first line treatment for rectal prolapse.

#### EFFICACY OF BIOFEEDBACK ASSOCIATED TO ELECTRO-STIMULATION FOR FECAL INCONTINENCE: A PILOT STUDY IN A UNIVERSITY HOSPITAL IN BRAZIL.

P262

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**Purpose/Background:** Fecal incontinence is more prevalent in older female patients, affecting one in every five over 65 years old and is considered a public health care issue. The management of this condition may be medical, conservative or surgical. Conservative treatment includes physiotherapy with pelvic floor rehabilitation through different resources allowing symptoms relief and quality of life improvement. Objectives: to evaluate the efficacy of biofeedback therapy for the management of fecal incontinence in a university public hospital.

**Methods/Interventions:** These are the preliminary results of a prospective study performed in a university hospital from Brazil from June 2015 until January 2016. The ethics committee approved the study and patients were recruited from the colorectal functional outpatient unit. During the sessions of pelvic floor physiotherapy patients underwent electro-stimulation and biofeedback therapy in different positions, pelvic floor kinesiotherapy, postural exercises and were oriented about the correct position for defecation. Patients answered a questionnaire with personal data, fecal condition at the beginning of the treatment and the severity incontinence score before and after treatment by Cleveland Clinic Florida (CCF) Score.

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	Posterior Suture Rectopexy (n=53)	Ventral Mesh Rectopexy (n=47)	p Value
Age (yr)	57.8 ± 2.1	63.8 ± 2.0	0.044
ASA	2.3 ± 0.1	2.6 ± 0.08	0.0787
Surgery Time (min)	155.4 ± 9.0	181.9 ± 9.6	0.049
Hospital Stay (days)	2.5 ± 0.1	1.8 ± 0.2	0.003
Follow-up Time (mos)	14.9 ± 2.1	3.7 ± 0.5	<0.0001
Complications (%)	5.66	12.24	0.2991
Recurrences (%)	11.31	8.51	0.7457
Time to Recur (mos)	11.4 ± 4.0	5.2 ± 1.3	0.2214

**Results/Outcome(s):** During the study period 23 patients were evaluated, 21 (91.3%) female, with a mean age of 63.6 ( $\pm 12$ ) years old. Patients underwent a mean of 15.4 sessions of pelvic floor physiotherapy and the baseline CCF score was 12.7 ( $\pm 4.4$ ) going down to 5.6 ( $\pm 4.5$ ) after treatment. The population studied presented a mean gain of 43.99% of the perfect anal continence, comparing initial and final outcomes regarding incontinence severity score.

**Conclusions/Discussion:** Pelvic floor physiotherapy improved outcomes in patients with fecal incontinence. This minimally invasive tool is an effective for pelvic floor dysfunction in a short period, reducing the need of more invasive options such as surgery.

#### ASSESSMENT OF VARIABLES WITHIN AND IN ADDITION TO A RISK PREDICTION TOOL FOR DEATH OR READMISSION AFTER COLORECTAL SURGERY.

P263

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**Purpose/Background:** Readmission rates after surgery are scrutinized due to public reporting and financial penalties. Risk prediction tools derived from large datasets can aid in targeting interventions to reduce this adverse event. One such tool, the LACE index (Length of stay, Acuity, Comorbidity, and Emergency department visits in the 6 months prior to admission) was developed to be easily employed at discharge but its applicability to the colorectal surgery population has not been explored.

**Methods/Interventions:** We identified patients undergoing their first non-trauma colorectal or small bowel resection using the Healthcare Cost and Utilization Project State Inpatient and Emergency Department databases for New York (2006-2013), Florida (2006-2014), and California (2006-2011). Patients were excluded if length of stay was  $\leq 2$  or  $\geq 14$  days. Comparative statistics were performed using chi-square and t-tests. The LACE index was evaluated using the c statistic derived from a logistic regression model.

**Results/Outcome(s):** Of 469,070 cases, 359,664 patients met the length of stay inclusion criteria (76.7%). Median

age was 65 years (interquartile range, IQR, 53-76) with 46.5% male. 36.2% of cases were performed for primary colorectal cancer and 26% for diverticulitis. Inpatient mortality was 3.1% (n=11,103). Among those discharged from their index hospitalization (n=348,561), the 30-day readmission rate was 12.6% and 30-day mortality was 0.3%. Patients experiencing a 30-day readmission or death tended to be older (64.5 vs 63.2 years;  $p < 0.001$ ), non-Caucasian ( $p < 0.001$ ; OR 1.09, 95% CI 1.07-1.12), and lacked private insurance ( $p < 0.001$ ; OR 1.40, 95% CI 1.37-1.43). Ileostomy creation (n=19,965, 5.7%) was independently associated with 30-day readmission or death (OR 2.63, 95% CI 2.55-2.72), as was colostomy (n=38,358, 11.0%; OR 1.38, 95% CI 1.34-1.42). The c statistic for the LACE index in this population was 0.61, less than in the initial LACE population (c=0.70). Multivariate logistic regression combining ileostomy, colostomy, and LACE variables demonstrated that stoma creation remains significantly associated with 30-day readmission (Table) and improves the fit of the model (c=0.64).

**Conclusions/Discussion:** The LACE index is an inadequate predictor of 30-day readmission or death after colorectal surgery. Stoma creation is a strong predictor of this outcome. Colon surgery-specific variables should be included in risk prediction tools for this patient population.

#### THE IMPACT OF COMORBIDITY BURDEN ON INCIDENCE OF ANASTOMIC LEAKS IN PATIENTS UNDERGOING LOW ANTERIOR RESECTION: RESULTS FROM A REAL-WORLD DATABASE ANALYSIS.

P264

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**Purpose/Background:** Anastomotic leak is a serious complication after colorectal surgery, especially in low anterior resection (LAR) and contributes significantly to postoperative morbidity and healthcare costs. The impact of pre-existing comorbidity burden in elevating the risk of anastomotic leaks has not been quantified in large patient samples in real world settings. This abstract is to estimate

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Variable	Median (IQR) or % (n)	OR	95% CI		p-value
Length of stay (days)	6 (4 - 9)	1.08	1.08	1.09	<0.001
ED visits 6 months prior to surgery admission	0 (0; 19.4% with any visit)	1.19	1.18	1.20	<0.001
Charlson Comorbidity Index score	2 (0 - 3)	1.08	1.07	1.08	<0.001
Emergent surgical admission	31.8% (108,708)	1.08	1.06	1.11	<0.001
Ileostomy	5.7% (19,964)	2.48	2.40	2.57	<0.001
Colostomy	11.0% (38,358)	1.19	1.15	1.23	<0.001

the impact of pre-existing comorbidity burden on the incidence of anastomotic leaks following LAR in a nationally representative administrative dataset.

**Methods/Interventions:** The study was conducted using the Premier Perspective database which is a nationally representative sample of all hospital discharges in the US. Included patients were 18 years of age or older and had an elective LAR (ICD-9 code: 48.6, 48.62, and 48.63) from 01/2008 to 09/2015. Anastomotic leak was defined for this analysis as the presence of potentially related in-hospital intra-abdominal complications identified by their respective ICD-9 diagnosis codes. Comorbidity burden was measured using the Charlson Comorbidity Index (CCI). Comorbidity burden (CB) was categorized into: no CB (CCI=0), low CB (CCI=1, 2), moderate CB (CCI=3, 4), and severe CB (CCI>=5). A multivariable logistic regression model was built to estimate the odds ratios of each CCI group with no CB as the reference group. A broad range of control variables were adjusted in the model, including patient demographics, hospital and provider type, surgical approach, payer, geographic region, and year of surgery. Subgroup analyses were performed among colorectal cancer patients and non-cancer patients.

**Results/Outcome(s):** A total of 13,789 patients underwent elective LAR with an average age of 62.1 (18-89) years. Of these, 77.1% (10,624) had open surgery, and 23.0% (3,165) minimally invasive surgery. Colorectal cancer patients (n=8,834) accounted for almost two thirds (64.1%) of the sample. Incidence of anastomotic leak was 12.7% among all eligible patients, and varied in different CCI grades: 10.2% for no CB, 11.4% in low CB, 15.5% for moderate CB and 15.2% for severe CB. In the multivariable logistic model, patients with severe CB were 26.1% more likely (odds ratio: 1.261, 95% CI: 1.069-1.487) to suffer anastomotic leak compared to those with no CB. Similarly, the risk was increased by 20.6% among patients with moderate CB (OR: 1.206, 1.018-1.428). However, the risk was not different among patients with low or no CB (OR: 0.985, 0.848-1.144). The impact of CCI on anastomotic leaks did not differ based on cancer status.

**Conclusions/Discussion:** The risk of an anastomotic leak in patients undergoing LAR increased significantly for patients with CCI 3 and above. These results may aid in risk stratification and development of risk reduction strategies for patients undergoing LAR.

## ROBOTIC VERSUS LAPAROSCOPIC ELECTIVE COLECTOMY FOR LEFT SIDE DIVERTICULITIS: A PROPENSITY SCORE MATCHED ANALYSIS OF THE NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM DATABASE.

P265

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**Purpose/Background:** Surgery for colonic diverticulitis can be challenging due to previous inflammation. Robotic surgery might have an advantage over conventional laparoscopy under these circumstances. We intend to compare both surgical approaches in the elective management of left side diverticulitis while accounting for the patient preoperative characteristics and intraoperative details; particularly, concomitantly performed surgical procedures.

**Methods/Interventions:** The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database (2012-2014) was surveyed for patients undergoing elective left side/sigmoid colectomy for diverticulitis. Preoperative (demographics, co-morbidities and laboratory values) and intraoperative details (procedure performed, wound class, hand-assistance and type of concomitant surgical procedures) were matched on propensity scores derived from logistic regression model. Concomitant procedures were identified using the Current Procedural Terminology codes.

**Results/Outcome(s):** We identified 441 robotic and 6,776 laparoscopic cases that met our inclusion criteria. Mean patient age was 58.9 years. Mean BMI was 29.3 and 44.5% of patients were males. Low preoperative albumin (<3.5 mg/dl, 11.1% vs. 6.8%, P=0.003), colectomy with low pelvic anastomosis (58.3% vs. 49.4%, p=0.005), splenectomy (0.45% vs. 0.05%, p=0.002) and enterotomy repair (1.1% vs. 0.4%, p=0.029) were higher in the robotic group than the laparoscopic group. Hand-assistance (35.8% vs. 42.9%, P=0.003), splenic flexure take down (41.5% vs. 49.2%, p=0.002), and ureteric stent placement (18.6% vs. 23.5%, p=0.017) were less common in the robotic group than the laparoscopic group. Case-matched analysis showed that robotic surgery was associated with lower all-cause morbidity (19.3% vs. 13.9%, p=0.037), shorter hospital stay (4.75+/-3.25 days vs. 3.89+/-2.18 days, p<0.001), lower conversion rate (14.3% vs. 7.5%, p=0.001) and longer operative time (219.2+/-95.6 minutes vs. 188.8+/-82.3 minutes, p<0.001) than laparoscopic surgery. Similar results were obtained with multivariate analysis of the entire cohort.

**Conclusions/Discussion:** Robotic surgery is associated with shorter hospital stay, lower conversion rate and less all-cause morbidity than conventional laparoscopy for patients undergoing left side colectomy for diverticulitis; however, robotic surgery is associated with longer operative time.

**P264 Table 1: Description of patient, provider and procedure characteristics and their association with occurrence of Anastomotic Leaks**

Parameter	Category	Patients with Anastomotic Leaks (n=1,747)	Patients with no Anastomotic Leaks (n=12,042)	Odds Ratio	95% Confidence Limits	P value
Charlson Comorbidity Index	0 (no CB)	297 (17.0%)	2,610 (21.7%)	Ref.	Ref.	Ref.
	1-2 (low CB)	631 (36.1%)	4,901 (40.7%)	0.985	(0.848, 1.144)	0.8387
	3-4 (moderate CB)	403 (23.1%)	2,205 (18.3%)	1.206	(1.018, 1.428)	0.0299
	5+ (severe CB)	416 (23.8%)	2,326 (19.3%)	1.261	(1.069, 1.487)	0.0059
Age (years)	18-44	92 (5.3%)	1,063 (8.8%)	Ref.	Ref.	Ref.
	45 - 54	261 (14.9%)	2,628 (21.8%)	1.114	(0.868, 1.431)	0.3959
	55 - 64	456 (26.1%)	3,195 (26.5%)	1.542	(1.215, 1.957)	0.0004
	65-74	530 (30.3%)	3,025 (25.1%)	1.558	(1.183, 2.052)	0.0016
	75+	408 (23.4%)	2,131 (17.7%)	1.605	(1.202, 2.142)	0.0013
Gender	Male (ref. = female)	970 (55.5%)	5,918 (49.1%)	1.315	(1.184, 1.461)	<.0001
Marital status	Married	919 (52.6%)	6,562 (54.5%)	Ref.	Ref.	Ref.
	Single	613 (35.1%)	3,892 (32.3%)	1.080	(0.962, 1.212)	0.1940
	Other	215 (12.3%)	1,588 (13.2%)	1.002	(0.833, 1.204)	0.9864
Race	White	111 (6.4%)	717 (6.0%)	Ref.	Ref.	Ref.
	African American	333 (19.1%)	2,441 (20.3%)	1.075	(0.867, 1.333)	0.5086
	Other	1,303 (74.6%)	8,884 (73.8%)	0.921	(0.793, 1.069)	0.2800
Payor	Commercial	650 (37.2%)	5,927 (49.2%)	Ref.	Ref.	Ref.
	Medicaid	83 (4.8%)	554 (4.6%)	1.295	(1.007, 1.666)	0.0438
	Medicare	924 (52.9%)	4,937 (41.0%)	1.364	(1.144, 1.628)	0.0006
	Other	90 (5.2%)	624 (5.2%)	1.259	(0.989, 1.602)	0.0613
Urban Hospital		1,561 (89.4%)	11,199 (93.0%)	1.349	(1.109, 1.641)	0.0027
Teaching Hospital		779 (44.6%)	5,088 (42.3%)	1.176	(1.042, 1.327)	0.0087
Provider Region	Midwest	361 (20.7%)	2,003 (16.6%)	1.282	(1.074, 1.531)	0.0059
	Northeast	342 (19.6%)	2,540 (21.1%)	Ref.	Ref.	Ref.
	South	700 (40.1%)	5,212 (43.3%)	1.027	(0.879, 1.201)	0.7335
	West	344 (19.7%)	2,287 (19.0%)	1.141	(0.957, 1.361)	0.1410
Cost method	RCC (ratio of cost-to-charge) (ref. = procedural)	525 (30.1%)	3,364 (27.9%)	1.110	(0.982, 1.255)	0.0942
Hospital Bed size	1-300	503 (28.8%)	3,115 (25.9%)	Ref.	Ref.	Ref.
	301-500	680 (38.9%)	4,545 (37.7%)	1.026	(0.883, 1.193)	0.7341
	>500	564 (32.3%)	4,382 (36.4%)	0.894	(0.754, 1.059)	0.1944
Provider Specialty	Non Colon/Rectal Surgeon (ref. = Colon/Rectal Surgeon)	1,224 (70.1%)	8,080 (67.1%)	1.039	(0.922, 1.171)	0.5279
Surgical Volume	1-100	46 (2.6%)	201 (1.7%)	Ref.	Ref.	Ref.
	101-300	212 (12.1%)	1,219 (10.1%)	0.784	(0.548, 1.122)	0.1833
	301-500	179 (10.2%)	1,249 (10.4%)	0.649	(0.449, 0.938)	0.0215
	>500	1,310 (75.0%)	9,373 (77.8%)	0.737	(0.520, 1.045)	0.0867
Surgical Approach	MIP (attempted) [1] (ref. = open surgery (planned))	375 (21.5%)	2,790 (23.2%)	0.954	(0.842, 1.082)	0.4644
Surgical Year	2008	294 (16.8%)	1,700 (14.1%)	1.153	(0.964, 1.380)	0.1185
	2009	220 (12.6%)	1,595 (13.2%)	0.928	(0.766, 1.125)	0.4464
	2010	205 (11.7%)	1,430 (11.9%)	0.941	(0.774, 1.145)	0.5456
	2011	175 (10.0%)	1,475 (12.2%)	0.798	(0.652, 0.978)	0.0294
	2012	214 (12.2%)	1,745 (14.5%)	0.816	(0.675, 0.987)	0.0367
	2013	330 (18.9%)	2,110 (17.5%)	1.050	(0.886, 1.245)	0.5716
2014	309 (17.7%)	1,987 (16.5%)	Ref.	Ref.	Ref.	
Colorectal Cancer [2]		1,150 (65.8%)	7,684 (63.8%)			

[1] Minimally invasive procedures (attempted) included laparoscopic and robot-assisted surgeries regardless of whether they were successfully completed, or converted to open surgeries. Robot-assisted surgeries were determined by ICD-9 codes 17.4x. Laparoscopic procedures were identified with ICD9 code 54.21. Conversions from laparoscopic or robotics to open surgery were defined by the co-existence of lap code (54.21) and open codes (45.7x, 48.5, 48.52), and diagnosis code (V64.4x). Open surgeries were those procedures with open codes (45.7x, 48.5, 48.52), and no robotics (17.4x) and laparoscopic codes (54.21) and conversion codes (V64.4).

[2] Colorectal cancer codes: 153.x, 154.x, 197.5, 209.12 – 209.17. Colorectal Cancer status was not included as a covariable in the logistic regression model.

**VISCERAL FAT AREA, NOT BODY MASS INDEX, PREDICTS POSTOPERATIVE 30-DAY MORBIDITY IN PATIENTS UNDERGOING COLON RESECTION FOR CANCER.**

P266

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**Purpose/Background:** The use of computed tomography (CT) to assess cross-sectional visceral fat area (VFA) is novel. Postoperative complications potentially delay institution of adjuvant therapy and may adversely influence oncologic outcomes. While body mass index (BMI) is known to be associated with a greater risk for postoperative complications after colon cancer resection, whether VFA is a better predictor of these complications has not been well characterized. This study investigates the association between several obesity metrics as when compared to BMI and 30-day major morbidity in patients undergoing surgery for colon cancer.

**Methods/Interventions:** Patients undergoing primary elective colon resection for cancer, without neoadjuvant therapy, at a single institution from January 2010 – July

2016 were identified. A proprietary computer algorithm for fat quantification was used to calculate VFA, subcutaneous fat area (SFA), total fat area (TFA), and ratio of visceral-to-total fat areas (VTR) from preoperative abdominal CT scans. Demographic, intra-operative, and post-operative variables were obtained. Stepwise multivariate logistic regression models were designed to describe the association between body fat distribution variables and outcomes. Receiver operating characteristic (ROC) analysis was performed to determine optimal cut-off thresholds for predicting postoperative morbidity.

**Results/Outcome(s):** 266 patients with colon cancer were evaluated; mean age was 66.4 years, and 126 (47.4%) were female. The distribution of patients by American Joint Committee on Cancer staging was as follows: stage I, n = 57 (21.4%); stage II, n = 101 (38.0%); stage III, n = 89 (33.5%); stage IV, n = 19 (7.1%). Primary lesions were predominantly right sided (n = 146, 54.9%). Median BMI was 26.9 kg/m<sup>2</sup> (range 15.6 – 54.3 kg/m<sup>2</sup>); median VFA was 122.7 cm<sup>2</sup> (range 9.1 – 439.7 cm<sup>2</sup>). In univariate regression analysis, VFA but not BMI was associated with increased risk of 30-day major morbidity, defined as Clavien-Dindo grade ≥ III (p = 0.002, and p = 0.171, respectively). VFA remained associated with

**P266 Results of univariate and multivariate analyses of potential predictors of 30-day major morbidity**

	Major 30-day morbidity	No major 30-day morbidity	Univariable p‡	Multivariate analysis	
				Odds ratio†	p
Baseline characteristics					
No. (%)	28 (10.5)	238 (89.5)			
Mean age* (years)	69.1 (9.2)	66.1 (14.7)	0.138§		
Female gender	11 (39.3)	115 (48.3)	0.426		
ASA ≥ 3	21 (75)	124 (52.1)	0.027		
HTN	21 (75)	156 (65.5)	0.399		
HLD	17 (60.7)	103 (43.3)	0.107		
DM	15 (53.6)	64 (26.9)	0.007		
CAD/MI	9 (32.1)	66 (27.7)	0.659		
Laparoscopy	14 (50)	175 (73.5)	0.025		
Site of primary lesion					
Right colon	13 (46.4)	133 (55.9)	0.425		
Transverse colon	0 (0)	8 (3.4)			
Left colon	5 (17.9)	25 (10.5)			
Sigmoid colon	10 (35.7)	72 (30.3)			
Body fat distribution variables					
BMI*	28.8 (8.7)	27.2 (5.3)	0.358§	1.04 (0.97 - 1.11)	0.262
VFA*	188.4 (98.5)	135 (81.5)	0.002§	2.00 (1.25 - 3.20)	0.004
SFA*	284.2 (127.5)	263.4 (129.2)	0.419§	1.07 (0.78 - 1.48)	0.663
TFA*	472.6 (190.5)	398.4 (178.3)	0.04§	1.20 (0.94 - 1.51)	0.138
VTR*	0.398 (0.128)	0.335 (0.127)	0.013§	27.90 (0.96 - 810.08)	0.053

Values in parentheses are percentages unless otherwise indicated. \*values in parentheses are standard deviations, and †values in parentheses are 95% CI. ‡Fisher's exact test, except §Student's t-test. All variables with P < 0.100 in univariable analysis were considered in multivariable stepwise logistic regression analysis.

increased risk of 30-day major morbidity in multivariate analysis ( $p = 0.004$ ). In ROC analysis, a cut-off value of VFA  $> 191 \text{ cm}^2$  had 50% sensitivity and 76% specificity for 30-day major morbidity. Results of univariate and multivariate analyses of potential predictors of morbidity are given in table 1.

**Conclusions/Discussion:** In contrast to recent reports, these data suggest that increasing VFA, but not BMI, is significantly associated with risk of major postoperative morbidity. VFA may be incorporated into preoperative risk assessment to identify high risk patients.

### IMPROVED OUTCOMES WITH ENDOLUMINAL STENTING FOR ACUTE COLONIC OBSTRUCTION.

P267

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**Purpose/Background:** The advent of self-expandable metal stents (SEMS) has offered an alternative in the management of acute colonic obstruction (ACO). Multiple studies have evaluated the safety and efficacy of these stents in patients with ACO. Relatively few have directly compared SEMS and elective surgery with emergent surgery for benign or malignant ACO. The aim of this study was to compare these two treatment modalities for all patients presenting with ACO.

**Methods/Interventions:** This was a retrospective review examining patients diagnosed with ACO from January 2005 to February 2016 treated by a group of teaching colorectal surgeons. Data included age, sex, Charlson comorbidity score, obstruction etiology, number of stents required, all surgical procedures performed, length of stay, ICU admission rate, and procedure-related or postoperative complications. Data were analyzed using Fisher's exact and Wilcoxon rank sum tests.

**Results/Outcome(s):** We identified 41 patients with ACO between 2005-2016: 15 patients underwent emergent surgical intervention (Group I) and 26 patients who initially had SEMS placement (Group II). In Group II 17 patients were bridged to surgery and the remaining 9

had stent placement for palliative purposes. Operative procedures performed included loop colostomy (1), total abdominal colectomy with end ileostomy (2), segmental resection with end colostomy (18), and segmental resection with primary anastomosis with (2) or without (9) a diverting loop ileostomy. The etiologies of obstruction were diverticular stricture (17), colon cancer (12), rectal cancer (10), radiation induced stricture (1), and endometrial cancer (1), with no major differences between groups ( $p=0.3247$ ). There was no difference in age ( $p=0.3624$ ), sex ( $p=0.1954$ ), Charlson comorbidity score ( $p=0.2477$ ), or ICU admission rate ( $p=0.4908$ ) between the two Groups. The in-hospital complication rate was 86.7% in Group I and 38.5% in Group II ( $p=0.0036$ ). Complications included respiratory failure, pneumonia, CHF exacerbation, sepsis, CVA, DVT, surgical site infection (SSI), anastomotic leak, stoma complications, UTI, C. diff colitis, and stent perforation. Group II also had a shorter length of stay (14.1 vs. 9.4 days,  $p = 0.0355$ ) and reduced incidence of stoma formation (80% vs. 42%,  $p = 0.025$ ).

**Conclusions/Discussion:** This study suggests that endoluminal stenting for acute colonic obstruction is associated with decreased complications, shorter length of stay, and decreased incidence of ostomy creation.

### ROBOTIC RIGHT HEMICOLECTOMY WITH INTRACORPOREAL ANASTOMOSIS COMPARED WITH LAPAROSCOPIC EXTRACORPOREAL ANASTOMOSIS: A RETROSPECTIVE STUDY.

P268

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**Purpose/Background:** Robotic approach has overcome the technical difficulty of intracorporeal anastomosis in laparoscopic right hemicolectomies. This study aims to compare postoperative outcomes of standard laparoscopic extracorporeal anastomosis to robotic intracorporeal anastomosis.

**P267 Outcomes per Group**

	Group I (n=15) [n(%) or mean(SD)]	Group II (n=26) [n(%) or mean(SD)]	p-value
Charlson Comorbidity Index	5.7 (2.8)	6.9 (3.3)	0.2477
Postoperative Complication	13 (86.7%)	10 (38.5%)	0.0036
Length of Stay	14.1 (7.4)	9.4 (8.0)	0.0355
ICU Admission	5 (33.3%)	6 (23.1%)	0.4908
Ostomy Creation	12 (80.0%)	11 (42.3%)	0.0250

Group I = Emergent Surgery Only;

Group II = SEMS First +/- Surgery



**Methods/Interventions:** A comparative retrospective review was conducted of a prospectively maintained database from a single surgeon/single institution with both laparoscopic and robotic anastomosis technique for laparoscopic right hemicolectomies. A total of 80 consecutive patients, operated for neoplasm of the right colon, was identified over a five-year period. The robotic intracorporeal group included 62 patients. The laparoscopic extracorporeal group included 18 patients.

**Results/Outcome(s):** There was no significant difference in terms of age, sex, BMI or ASA score between the two groups. Intracorporeal anastomosis was associated with less overall postoperative complications. The robotic intracorporeal group had a decreased rate of surgical site infections (2% versus 16%;  $p < 0.05$ ). Mean length of stay was significantly shorter in the intracorporeal group (3.0 days versus 4.2 days;  $p < 0.05$ ). Extraction incision site was periumbilical in 100% of patients in the extracorporeal group and in the intracorporeal anastomosis group 100% of the patients had a Pfannenstiel extraction site. The incidence of incisional hernia was 0% for the robotic intracorporeal group versus 16% for the laparoscopic extracorporeal group;  $p < 0.05$ .

**Conclusions/Discussion:** Laparoscopic right hemicolectomy with robotic intracorporeal anastomosis is associated with less surgical site infections and incisional hernias. A substantial reduction in length of stay was observed with robotic intracorporeal anastomosis. Further, randomized prospective trials are needed to further support these findings.

#### COMPARATIVE OUTCOMES OF ROBOTIC COLECTOMY: A 4-YEAR REVIEW OF THE TARGETED COLECTOMY NSQIP DATABASE.

P269

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**Purpose/Background:** There have been limited large database studies comparing outcomes of robotic colectomy to both open and laparoscopic colectomy. The objective of this study is to compare the outcomes between these surgical approaches for elective colectomy.

**Methods/Interventions:** The 2012-2015 NSQIP targeted colectomy database was used to analyze patients undergoing elective colectomy. The patients were stratified by surgical approach (open surgery (OS), laparoscopic surgery (LS), and robotic surgery (RS)). Patient characteristics and co-morbidities were compared between surgical groups. Univariate and multivariate analyses were performed to assess risk adjusted primary outcomes (length of stay, anastomotic leak, post operative ileus, readmission, 30-day mortality, and serious morbidity).

**Results/Outcome(s):** From 2012-2015, 76,314 elective colectomies were identified. LS was the predominant surgical approach (61.5%). RS increased from 3.7% to 8.7%, while OS decreased from 48% to 30%. Hand-assist was used in 36.6% of LS and 35.9% of RS. Over the study period, the rate of conversion has decreased by 6.8% in LS (from 18% to 11.2%) and by 4.9% in RS (from 10.2% to 5.3%). RS had a longer mean operative time ( $231 \pm 102$  minutes) compared to OS ( $180 \pm 111$  minutes,  $p < 0.05$ ) and LS ( $180 \pm 87$  minutes,  $p < 0.05$ ). There was no significant difference in operative time between OS and LS. Length of stay was  $4.94 \pm 4.2$  days in RS compared  $6.06 \pm 5.9$  days in LS ( $p < 0.01$ ) and  $10.45 \pm 9.4$  days in OS ( $p < 0.01$ ). RS had lower rates of anastomotic leak (3.49% vs. 5.02%,  $p < 0.05$ ), ileus (OR=0.41, CI (0.37, 0.46),  $p < 0.05$ ), readmission (OR=0.74, CI (0.66, 0.83),  $p < 0.05$ ), mortality (OR=0.36, CI (0.22, 0.58),  $p < 0.05$ ), and serious morbidity (OR=0.40, CI (0.36, 0.44),  $p < 0.05$ ) compared to OS. LS was associated with lower rates of anastomotic leak (3.33% vs. 5.02%,  $p < 0.05$ ), ileus (OR=0.46, CI (0.44, 0.48),  $p < 0.05$ ), readmission (OR=0.71, CI (0.67, 0.74),  $p < 0.05$ ), mortality (OR=0.47, CI (0.41, 0.55),  $p < 0.05$ ), and serious morbidity (OR=0.43, CI (0.42, 0.45),  $p < 0.05$ ) compared to OS. There were no significant differences in the above risk-adjusted outcomes between RS and LS.

**Conclusions/Discussion:** RS and LS have superior surgical outcomes compared to OS. More studies are needed to evaluate the potential benefits of robotic colectomy. RS is a safe and effective surgical approach, with similar morbidity and mortality compared to the LS, and improved outcomes compared to the open approach.

#### CLINICAL AND FINANCIAL OUTCOMES AFTER ROBOTIC VERSUS LAPAROSCOPIC SURGERY: NOT ALL RESECTED COLORECTAL SEGMENTS ARE THE SAME.

P270

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**Purpose/Background:** The clinical and financial consequences of robotic technology have not previously been evaluated for the individual colorectal segment resected. This study aims to compare the outcomes of robotic to laparoscopic approach based on the segment of colorectal resection.

**Methods/Interventions:** From the Premier Perspective database, patients who underwent elective laparoscopic and robotic colorectal resections from 2012 – 2014 were included. Laparoscopic were propensity-score matched to robotic cases for demographics, diagnosis, co-morbidities, surgery type, surgeon specialty, hospital type and volume. The groups were compared for medical and surgical complications, hospital stay, 30-day readmission and costs.

**Results/Outcome(s):** Of 36,701 patients, 32,783 (89.3%) had laparoscopic and 3,918 (10.7%) robotic colorectal resection. After matching 4,438 laparoscopic and robotic procedures (2,219 in each group), laparoscopy was associated with 30-day readmission, while robotic approach had greater in-hospital costs. There was no difference in complications or hospital stay. On multivariable analysis, robotic transverse colectomy (4.1 days vs. 5.2 days,  $p=0.03$ ) and anterior resection (5.4 days vs. 5.8 days,  $p=0.02$ ) but laparoscopic total or multi-segment colectomy (8.2 days vs. 5.2 days,  $p=0.04$ ) were associated with shorter hospitalization. Costs were higher after robotic right (\$17,578 vs. \$13,398,  $p<0.0001$ ), sigmoid (\$18,846 vs. \$15,276,  $p=0.004$ ) colectomy as well as anterior (\$21,241 vs. \$17,595,  $p=0.001$ ) and abdominoperineal (\$22,877 vs. \$18,136,  $p=0.01$ ) resections. Medical and surgical complications and 30-day readmission were comparable for both approaches regardless of segment resected.

**Conclusions/Discussion:** This propensity-matched analysis clarifies outcomes and costs for robotic and laparoscopic approaches to colorectal resection by segment resected. A graded approach that prioritizes the use of robotic technology for selected colorectal procedures will allow a more cost-effective incorporation of this currently more expensive technology with several advantages into clinical practice.

#### ENHANCED RECOVERY AFTER SURGERY: ENHANCING PATIENT EXPERIENCE.

P271

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**Purpose/Background:** The aim of this study was to evaluate length of stay (LOS) in ERAS patients.

**Methods/Interventions:** We reviewed our institutional database of patients undergoing colorectal surgery following the initiation of the ERAS protocol, from October 2015 – October 2016. The ERAS protocol consists of pre-operative education, carbohydrate loading,

multimodal analgesia, avoidance of narcotic medications, minimizing intravenous (IV) fluids, maintenance of normothermia, early mobilization, and avoidance of drains. We sought to compare the outcome of LOS in this group of patients with a group of matched historical controls (HS) who underwent colorectal surgery within the year preceding ERAS implementation. Categorical variables were analyzed using Chi square test and continuous variables were evaluated using Fisher's exact test. Statistical significance was defined as  $p<0.05$ .

**Results/Outcome(s):** There were 95 patients in the ERAS group and 100 in the HC group. The groups were similar in their composition of diagnoses. Colon cancer, anorectal cancer, diverticular disease, Crohn's disease, and ulcerative colitis were the most common diagnoses. The rates of colectomy, low anterior resection, abdominoperineal resection, proctectomy/ileal pouch-anal anastomosis, ostomy creation/revision and ostomy closure were also similar between the two groups. LOS was shorter in the HC group by 1 day (Table 1). Time to return of bowel function was earlier in the HC group by 0.7 days. Total Intraoperative narcotic use and number of patient controlled analgesia days (PCA) were significantly less in ERAS patients. Additionally, use of long acting intraoperative narcotics was significantly less in the ERAS group (14.7% vs 81%,  $p < 0.001$ ). Despite minimizing narcotic use in ERAS patients, LOS was not decreased in and time to return of bowel function was not reduced. Both of these findings were statistically significant. There were no differences in complications between the 2 groups: ED visit within 30 days (7 vs 9,  $p = 0.976$ ), readmission within 30 days (11 vs 13,  $p = 0.829$ ), ileus (12 vs 5,  $p = 0.076$ ), pneumonia (1 vs 0,  $p = 0.487$ ), surgical site infection (7 vs 12,  $p = 0.338$ ), urinary tract infection (3 vs 5,  $p = 0.722$ ).

**Conclusions/Discussion:** We have demonstrated that an ERAS program did not lead to improvements in LOS despite many of the target metrics having been met. This may indicate that ERAS colorectal patients could benefit from additional interventions to enhance postoperative outcomes, improve length of stay, and reduce time to return of bowel function. Additionally, we may suggest

#### P270 Multivariable analyses for length of stay and in-hospital costs associated with laparoscopic vs. robotic approach based on specific colorectal segment resected.

Segment resected	Length of stay, mean (day)			In-hospital costs, mean (US Dollars)		
	Laparoscopy	Robot	p-value	Laparoscopy	Robot	p-value
Right colectomy	4.8	4.6	0.3	\$13,398	\$17,578	<0.0001
Transverse colectomy	5.2	4.1	0.03	\$13,531	\$16,482	0.4
Left colectomy	4.8	4.7	0.9	\$14,721	\$18,633	0.1
Sigmoid colectomy	4.6	4.6	1.0	\$15,276	\$18,846	0.004
Total or multi-segment colectomy	5.2	8.2	0.04	\$15,448	\$28,594	0.2
Anterior resection	5.8	5.4	0.02	\$17,595	\$21,241	0.001
Abdominoperineal resection	5.9	6.5	0.05	\$18,136	\$22,877	0.01
Other rectal procedure	5.3	5.6	0.6	\$16,002	\$20,264	0.1

that the benefits of ERAS may not be reflected in LOS but may be revealed in the post-discharge recovery period.

Post-Operative Patient Experience with ERAS			
Variable	ERAS (Mean)	Control (Mean)	p
Length of Stay (days)	5.64	4.63	0.021*
Operative Time (hours)	5.34	4.7	0.081
Intraop Fluids (mL)			
Total Fluids (mL)	1622.71	2122.9	0.005*
Fluids rate (mL/kg/h)	3.81	6.23	<0.001*
PACU Temperature (C)	36.54	36.62	0.536
Narcotics (mg morphine)			
Intraoperative	28.72	46.75	<0.001*
PACU	8.7	8.13	0.627
Post-Op IV Narcotics	84.34	93.83	0.557
Post-op PO Narcotics	18.22	31.56	0.559
Total Narcotics	139.92	177.68	0.219
Post-Operative Day Patient off IV Narcotics	4.06	3.01	0.316
PCA Days	1.43	2.11	0.005*
Pain Scores			
PACU	5.07	4.93	0.730
Post-Operative Day 1	4.41	4.62	0.454
Post-Operative Day 2	5.05	6.17	0.641
Post-Operative Day 3	3.98	4.24	0.366
Post-Operative Day 4	4.06	4.04	0.925
Post-Operative Day 5	4.25	6.05	0.408
Fluid Balance at Discharge (mL)	263.11	1294.11	0.045*
Diet			
Post-Operative Day Given Clears	0.44	1.49	0.001*
Regular Diet	3.22	2.96	0.330
Tolerating Regular Diet (Intake >800mL)	4.12	3.55	0.112
Return of Bowel Function (Day)	3.01	2.31	0.013
Doses of Antiemetics	1.26	1.03	0.392
Mobilization (number of times)			
Post-Operative Day 0	0.72	0.21	0.001*
Post-Operative Days 1-5	3.35	2.93	0.108

## THE EFFECT OF SURGEON OPERATIVE MIX ON ILEAL POUCH-ANAL ANASTOMOSIS OUTCOMES.

P272

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**Purpose/Background:** Numerous studies have demonstrated a volume-outcome relationship in complex surgical procedures. The aim of this study is to determine the effect of complex colorectal pelvic operation volume (operative mix) on ileal pouch anal anastomosis (IPAA) mortality.

**Methods/Interventions:** The National Inpatient Sample (NIS) database (2004-2009) was used to evaluate outcomes after IPAA surgery. This time period was selected based on the availability of surgeon ID numbers linked to patient outcomes. Surgeons were classified as high or low IPAA volume and stratified by operative mix (OM). OM was defined as the year-specific number of complex colorectal pelvic operations, specifically low anterior resection, abdominoperineal resection, rectopexy, and coloanal pull-through operations. Mortality was compared among 4 groups: 1) high IPAA/ high OM, 2) high IPAA / low OM, 3) low IPAA/high OM, 4) low IPAA /low OM. Prolonged length of stay was also compared among groups.

**Results/Outcome(s):** Among 1,606 surgeons, 71.8% performed 1 IPAA operation/year(y), 18.2% performed 2-3 IPAA/y, 8.2% performed 4-10 IPAA /y, 1.8% 11+ IPAA/y. The overall mortality after IPAA was 1.73% (52/3,005). Low IPAA volume surgeons (1-3 cases/y) with high OM (15+ cases) had similar mortality after IPAA compared to high IPAA surgeons (4+/y) with high OM (0.49% vs 0.48% p=1.0). Low IPAA surgeons with low OM (<15 cases) had significantly worse mortality (3.1%) compared to low IPAA surgeons with high OM (p<0.01) and high IPAA surgeons with high OM (p<0.01)(Figure 1). OM is a significant predictor of mortality on logistic regression for mortality [OR 0.45 (95% CI 0.35, 0.58), p<0.001], however this relationship was lost after logistic regression analysis. Prolonged LOS (pLOS), defined as LOS >7d(mean LOS), was observed in 35.1% cases of low IPAA surgeons/high OM and 40.4% of cases of high IPAA/high OM surgeons (p=0.064). Additionally, 55.2% of cases of low IPAA/low OM surgeons had pLOS (p<0.03 compared to all groups). OM was a significant predictor of pLOS in mixed effects regression with 15+ OM cases associated with an OR of 0.48 (95% CI 0.28, 0.81) (p=0.01).

**Conclusions/Discussion:** IPAA is infrequently performed by most surgeons. An operative mix that includes a high proportion of pelvic dissections is associated with lower mortality and pLOS after IPAA. This association is independent of pelvic dissection type. These data suggest that comfort with pelvic dissection is an important factor in outcomes after IPAA.

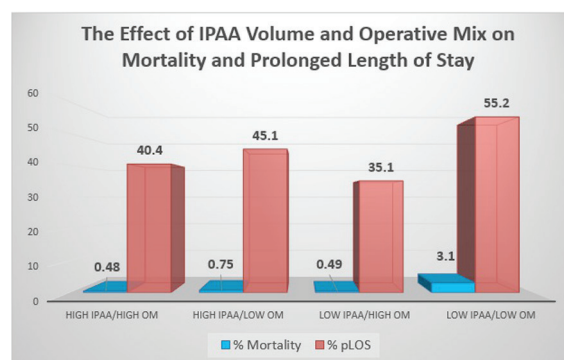


Figure 1: The Effect of IPAA Volume and Operative Mix on Mortality and Prolonged Length of Stay

## TEN-YEAR EVALUATION OF COLORECTAL CANCER IN YOUNG PATIENTS.

P273

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**Purpose/Background:** Although the overall incidence of colorectal cancer (CRC) is on the decline, in younger patients (<50 years) it is reportedly on the rise. Additionally, there are varied accounts of a worsened

prognosis and survival in these young patients. This study presents a 10-year evaluation of “younger” CRC patients, including clinical characteristics, prognostic factors, and overall survival.

**Methods/Interventions:** A prospective database of all CRC patients diagnosed between January 2005 and April 2015 was divided and analyzed according to age. Group 1 consisted of patients <50 years and group 2 of patients  $\geq$ 50. Demographics, tumor staging, and survival were compared between groups. Additional data was retrospectively collected on the younger patients, including comorbidities, presenting symptom(s), pathology, and family history.

**Results/Outcome(s):** During our 10-year study period, 767 patients were diagnosed with CRC. From these, 113 (14.7%) were <50 years and 654 patients were  $\geq$ 50. Data showed no significant increase in the incidence of CRC in younger patients; there was, however a steady increase in the overall number of patients diagnosed (Table 1). The majority of patients in both groups were Caucasian (group 1, 77.9% vs. group 2, 82.6%); gender was also comparable (53.0% vs. 48.2%, male). Mean age was  $42.5 \pm 6.7$  vs.  $70.0 \pm 10.7$  years. Approximately 90% of younger patients were symptomatic at diagnosis, with 54.4% having multiple symptoms. These included blood in stool (72.8%), cramping/abdominal pain (51.8%), diarrhea and/or constipation (31.6%), rectal bleeding (26.3%), and unintended weight loss (12.3%). Comorbidities in younger patients included smoking (14.9% current and 75.4% former), hypertension (23.7%), and diabetes (9.6%). Only 11.5% of younger patients had a first-degree family history of CRC. No significant differences were seen between age groups in terms of advanced tumor staging (3 or 4). Younger patients, however, were associated with an increased survival rate (76.1%) when compared to older patients (62.1%) ( $p=0.006$ ). The majority of these younger patients had low grade cancers (66%) that lacked both lymphovascular (67%) and perineural invasion (85%). The majority also underwent surgery and subsequent chemotherapy (63.2%).

**Conclusions/Discussion:** These data showed no significant increase in the incidence of CRC in younger patients. The majority of young patients did present with symptoms;

however, family history was not a prognostic factor. Lastly, younger CRC patients were not associated with an increased rate of advanced staging or mortality.

### GASTROINTESTINAL BLEEDING FOLLOWING COLORECTAL SURGERY WITH STAPLED ANASTOMOSIS.

P274

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**Purpose/Background:** Gastrointestinal bleeding (GIB) is one of the most common complications following colorectal surgery with a reported incidence of 5.5%. Clinically significant GIB following colorectal surgery can presumably increase hospital length of stay, lead to interruption of thromboembolism prophylaxis, and subject patients to risks associated with blood transfusion. Risk factors associated with post-operative gastrointestinal hemorrhage have not been well defined in the literature nor has the relationship to length of hospital stay. This study aims to identify risk factors associated with GIB following elective colorectal surgery with primary anastomosis.

**Methods/Interventions:** This is a retrospective study examining elective colorectal resections performed by two fellowship-trained colorectal surgeons between March 2013 and May 2016. Patients >18 years of age with a single ileocolic or colorectal anastomosis were included. Electronic medical records were reviewed dividing patients into two groups based on whether or not they experienced GIB post-operatively. Multiple variables were analyzed including patient factors (American Society for Anesthesiologists physical assessment classification, body mass index, presence of diabetes, smoking status, benign vs. malignant pathology), operative factors (anastomotic site, operative time, estimated blood loss), and post-operative factors (use of prophylactic anti-coagulation with unfractionated heparin (UFH) vs. low molecular weight heparin (LMWH), use of platelet-inhibiting medication).

**P273 Incidence of patients diagnosed with colorectal cancer (CRC) by age and year.**

Year first seen	Total	Patients <50yo n (%)	Patients $\geq$ 50yo n
2005	51	6 (11.8)	45
2006	46	8 (17.4)	38
2007	43	7 (16.3)	36
2008	63	10 (15.9)	53
2009	58	10 (17.2)	48
2010	87	13 (15.0)	74
2011	101	12 (11.9)	89
2012	87	17 (19.5)	70
2013	96	16 (16.7)	80
2014	112	11 (9.8)	101

Secondary endpoints include the need for post-operative blood transfusion and average length of hospital stay. Confidence intervals with  $\alpha = 0.05$  were compared to determine statistical significance.

**Results/Outcome(s):** Over a 38-month period, 244 patients presented for elective colorectal resection in which either ileocolic or colorectal primary anastomosis was performed. Sixty-six ileocolic and 178 colorectal anastomoses were performed using linear or circular stapling devices, respectively. Overall, 17.6% of patients had documented GIB ranging from post-operative day zero to twelve. Of these patients with GIB, 11.6% required blood transfusion. GIB was noted in 9 patients with ileocolic anastomosis (13.6%; 95% CI [2.1%, 25.2%]) and 34 of those with colorectal anastomoses (19.1%; 95% CI [5.9%, 32.3%]). Average length of stay did not vary significantly between the GIB (4.0 days; 95% CI [0, 9.7]) and Non-GIB (4.5 days; 95% CI [0, 21.6]) groups. None of the patient-, operative-, or post-operative factors examined were found to correlate significantly with post-operative GIB (Table 1).

**Conclusions/Discussion:** Post-operative GIB after colorectal surgery did not significantly increase length of hospital stay or need for post-operative blood transfusion as compared to those patients without GIB. Further studies are needed to evaluate variables not tested here such as different stapling techniques or hand-sewn anastomosis.

## DEVELOPMENT OF A PREDICTION MODEL FOR READMISSION AFTER ILEOSTOMY CREATION IN COLORECTAL SURGERY PATIENTS.

P275

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**Purpose/Background:** Colorectal surgery patients have a higher postoperative morbidity than general surgery patients. Those with ileostomies appear to be the most disadvantaged due to stoma-related complications and dehydration, which is the most common indication for postoperative readmission in this cohort. While historical readmission rates for colorectal surgery range from 10% to 30%, they are much higher ( $\leq 65\%$ ) in patients with new ileostomies. We aimed to identify risk factors for 30-day readmission following discharge after ileostomy creation and develop a readmission prediction model.

**Methods/Interventions:** Patients who underwent ileostomy creation during a colorectal surgery procedure from 2013-2016 at University of Florida Health were included in this IRB approved study. Patients readmitted within 30 days of discharge were compared to those that were not, to identify variables significantly associated with readmission. A practical, predictive model to stratify patient's risk of readmission after the index procedure was developed.

**Results/Outcome(s):** A total of 86 patients who underwent an ileostomy were included (43 males, 43 females) of which 22 patients (26%) were readmitted in the 30 days following discharge after the index procedure. The average length of stay after the index procedure (ileostomy creation) was 9.3 days and cost \$30,918. The average cost of readmission was \$13,839. Readmissions happened on average 8.5 days after the initial discharge and were most commonly due to dehydration from high ostomy output

### P274 Comparison of patient characteristics, operative factors, post-operative anticoagulation as well as length of stay

	GIB	Non-GIB	p-value
Age (year)	59.4	62.0	>0.05
Sex (% Female)	55.8%	54.2	>0.05
BMI	27.6	28.6	>0.05
Diabetes	16.3%	17.9%	>0.05
Smokers	9.3%	16.9%	>0.05
Malignancy	20.9%	37.6%	>0.05
ASA PA Classification	2.2	2.3	>0.05
OR Time (min)	233	237	>0.05
Estimated Blood Loss (cc)	83.3	112.8	>0.05
UFH VTE prophylaxis	100.0%	95.5%	>0.05
LMWH VTE prophylaxis	0.0%	1.0%	>0.05
Anti-Platelet	9.3%	12.4%	>0.05
Transfusion	9.3%	7.7%	>0.05
Length of Stay (days)	4.0	4.5	>0.05

(45%) or ileus (18%). Factors significantly associated with readmission included baseline steroid use, history of diabetes, history of depression, complications of bowel obstruction and high ostomy output during the index admission, lack of postoperative ostomy teaching, lack of discharge planning by social workers and discharge with a PICC line. A 30-day readmission prediction model was created as below with a sensitivity of 73% and a specificity of 77% (Figure 1).

**Conclusions/Discussion:** Prediction of readmission in patients undergoing an ileostomy creation appears possible. Modification of the variables identified, such as preoperative weaning of steroid use, better preoperative control of comorbidities, dedicated postoperative ostomy teaching and ensuring social work participation in discharge planning may help decrease the readmission rate, which is a quality metric now tied to hospital reimbursement. Prospective validation of the prediction model in a larger cohort is needed.

Interpretation of Parameter Estimates

Variable	Parameter Estimate	Interpretation
Intercept	-3.120	The average probability of readmission for a patient that does not currently use steroids and does have diabetes, depression, or social work planning for discharge is 4.416%.
Steroid	1.185	All other predictor variables held constant, a patient that currently uses steroids has a 3.27 times increase in readmission risk than a patient that does not currently use steroids.
Diabetes	1.206	All other predictor variables held constant, a patient with diabetes has a 3.340 times increase in readmission risk than a patient without diabetes.
Depression	1.047	All other predictor variables held constant, a patient with depression has a 2.849 times increase in readmission risk than a patient without depression.
Social Work	1.640	All other predictor variables held constant, a patient who had social work planning for discharge has a 5.155 times lower readmission risk than a patient who did not have social work planning for discharge.

$$p = \frac{e^{-3.120 + 1.185 \cdot X_{steroid} + 1.201 \cdot X_{diabetes} + 1.047 \cdot X_{depression} + 1.640 \cdot X_{socialwork}}}{1 + e^{-3.120 + 1.185 \cdot X_{steroid} + 1.201 \cdot X_{diabetes} + 1.047 \cdot X_{depression} + 1.640 \cdot X_{socialwork}}}$$

p = the probability of a patient being readmitted  
 $X_{steroid} = 0$  (if the patient was not on preoperative steroids) versus 1 (if the patient was on steroids)  
 $X_{diabetes} = 0$  (if the patient did not have diabetes) versus 1 (if the patient had diabetes)  
 $X_{socialwork} = 0$  (if the patient had no social work planning for discharge) versus 1 (if there was social work planning for discharge)

Figure 1: Statistically significant variables predicting readmission – readmission predictive model.

### SUCCESSFUL ENHANCED RECOVERY PATHWAY FOR COLORECTAL SURGERY IN A LARGE, URBAN SAFETY-NET HOSPITAL.

P276

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**Purpose/Background:** There is ample evidence that Enhanced Recovery Pathways (ERPs) decrease length of stay (LOS) and improve outcomes in colorectal surgery. However, there is a paucity of information regarding the effectiveness of ERPs in the safety-net setting, which predominantly serves the vulnerable under- and un-insured. It is known that such patient populations are at a higher risk for poor surgical outcomes and longer hospital stays due to a variety of factors including limited resources and various social determinants of health. The aim of this study is to determine the impact of an ERP on the length

of stay and readmissions for elective colorectal surgery at a safety-net hospital without social interventions.

**Methods/Interventions:** A multidisciplinary panel of experts utilized evidence-based best practices for colorectal surgery to create a comprehensive perioperative ERP. Preoperative components included standardized patient education, optimization of co-morbidities, multimodal analgesia for perioperative pain, and carbohydrate loading. Intraoperative components focused on avoiding fluid overload and minimizing opioid use. Postoperative components included minimization of opioids, early ambulation, early discontinuation of indwelling urinary catheter, and early resumption of diet. The ERP did not include social interventions. The pathway was implemented in September 2014 at a large, urban safety net hospital. Process and outcomes metrics from 100 consecutive patients who underwent elective colorectal surgery in the 18 months prior to ERP implementation were compared to a similar group post implementation. Surgeons and discharge criteria remained the same throughout. Primary end points were length of stay and readmissions. Secondary endpoints included time to ambulation, time to solid food, and time to return of bowel function.

**Results/Outcome(s):** In both cohorts, the funding sources for the majority of patients were either charity care or Medicaid. There was no difference in the ratio of open to laparoscopic cases between the cohorts (p=0.547), or in the ratio of colon to pelvic cases (p=0.373). Following ERP implementation, the total hospital length of stay was reduced from 7.5 to 5.1 days (p=0.003) and the 30-day all-cause readmission rates did not change (22% to 22%; p=1). Mean time to ambulation was reduced from 2.2 to 1.5 days (p=0.001). Mean time to resumption of solid food was reduced from 4.6 to 2.4 days (p<0.001). Mean time to return to bowel function was 3.4 to 2.5 days (p=0.001).

**Conclusions/Discussion:** It is possible to decrease length of stay without increasing readmissions for elective colorectal surgery in a large, urban safety-net setting, even without special interventions to address socioeconomic barriers to health. The cost of ERP implementation is minimal, and there is significant potential for cost savings. Thus, it would be advantageous for all safety net facilities to consider adopting ERP.

### HISTOLOGICAL ASSESSMENT OF COLLAGEN DEPOSITION WITHIN ENTEROCUTANEOUS FISTULA TRACTS SECONDARY TO DIVERTICULITIS.

P277

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**Purpose/Background:** Enterocutaneous fistulas (ECF) are defined as abnormal communications between the gastrointestinal tract and the skin. The majority of ECFs

are iatrogenic in nature (~85%). Surgical procedures such as those for intra-abdominal malignancy, inflammatory bowel disease (IBD), diverticulitis and repeated explorations for adhesions are at a higher risk of resulting in an ECF. The rest occur spontaneously, often secondary to inflammatory bowel disease, perforated diverticulitis, radiation enteritis, trauma, perforated tumours and intra-abdominal sepsis. Colonic diverticular disease is a common phenomenon predominant in western society affecting 65% of people over the age of 65 years and characterised by the outpouching of colonic mucosa due to acquired herniation through the colonic wall. Several factors play a role in the pathophysiology and formation of these diverticulae. Structural changes within the colonic wall itself with weakening of the extracellular matrix and changes in the type and content of collagen and elastin is a key factor. Histological assessment of the colonic tissue in patients with diverticulitis has revealed that the submucosal layer composed mainly of collagen fibrils plays an important role in maintaining the viscoelastic integrity of the colonic wall. Increase in cross-linking has been noted in elderly patients with diverticulosis which leads to colonic rigidity and reduced flexibility. No study to date has directly assessed the histological changes associated with patients who have developed ECFs secondary to diverticulitis and whether this predisposes to poorer healing and a possible higher rate of re-fistulization.

**Methods/Interventions:** This study will assess the histological structure and the morphology of collagen deposition in colonic tissue from patients who have undergone resections for diverticulitis and diverticular ECFs. Specific histological features will be looked at in order to ascertain whether the type of collagen and its distribution contribute towards these ECFs developing. The secondary aim will be to further evaluate the tissues using immunohistochemical staining techniques to further delineate the collagen types and changes to other compartments (e.g. elastin / collagen in the extracellular matrix).

**Results/Outcome(s):** 10 samples were identified in each group and analysed using haematoxylin-eosin and picrosirius staining. Preliminary results have suggested that the collagen deposition in samples collected following diverticular ECF's was morphologically different from those patients who did not have a diverticular aetiology.

**Conclusions/Discussion:** These morphological changes in collagen deposition could potentially explain the difficult nature of diverticular ECF management along with a higher rate of re-fistulization following definitive surgery.

## CHARACTERISTICS AND POSTOPERATIVE OUTCOMES OF PATIENTS UNDERGOING TOTAL ABDOMINAL COLECTOMY FOR COLONIC INERTIA.

P278

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**Purpose/Background:** Total abdominal colectomy (TAC) with ileorectal anastomosis has become the procedure of choice for patients with colonic inertia (CI) and symptoms refractory to medical treatment. Patient satisfaction is generally high, and dissatisfaction has been associated with persistent symptoms postoperatively rather than absolute frequency of bowel movements. The purpose of our study was to evaluate the patient profile and functional outcomes of patients undergoing TAC for CI at our tertiary care center with dedicated colorectal surgery and motility disorder centers.

**Methods/Interventions:** We conducted a retrospective cohort study of all patients undergoing TAC for CI between 2003 and 2013. Charts were reviewed for patient demographics, preoperative symptoms and bowel function, and discrete patient outcomes (leak, abscess, fascial dehiscence, wound infection, average weekly bowel movements, laxative use, incontinence and postoperative symptoms). Frequencies were calculated for ordinal variables. Means and standard deviations were calculated for categorical variables. SPSS version 22 was used for statistical analyses.

**Results/Outcome(s):** A total of 17 patients with diagnosis of CI underwent TAC at our institution during the study period. Twelve patients had delayed colonic transit documented on preoperative nuclear medicine transit study. Mean follow-up time was 20 months. Eleven patients were still in follow-up one year after their operation. The most common symptom reported preoperatively was abdominal pain (Table 1). The overall morbidity of TAC for CI was low. There was one anastomotic leak requiring return to operating room for diverting ileostomy. There were two superficial wound infections and three patients had prolonged ileus. There were no mortalities. The reported mean number of weekly bowel movements increased to 16.3 (SD 8.8) from a preoperative mean of 3.2 (SD 2.59) per week. Six patients reported abdominal pain postoperatively. Five of those had reported chronic pain preoperatively. Only one patient continued to require daily laxatives to achieve bowel function. No patients reported problems with incontinence.

**Conclusions/Discussion:** At our institution, the majority of patients with CI who underwent TAC experienced resolution of symptoms postoperatively. Most with persistent pain postoperatively had chronic pain prior to surgery. Larger prospective studies are needed to evaluate preoperative factors, such as reported symptoms and whole-gut scintigraphy, that may predict outcomes of TAC for CI and help guide patient selection for this procedure.

**Table 1. Pre- and Post-operative patient characteristics**

Variable	N (percent)
Female gender	14 (82.4)
<b>Preoperative:</b>	
Laxative use	12 (70.6)
Other medications to assist BM	10 (58.8)
Required maneuvers to facilitate BM	2 (11.8)
Abdominal pain	12 (70.6)
Bloating	8 (47.1)
<b>Postoperative:</b>	
Laxative use	1 (5.9)
Incontinence	0 (0)
Abdominal pain	6 (35.3)

### THE ROLE OF NEGATIVE PRESSURE WOUND THERAPY IN THE MANAGEMENT OF ENTEROCUTANEOUS FISTULAS: A SYSTEMATIC REVIEW.

P279

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**Purpose/Background:** Enterocutaneous fistulas (ECFs) are defined as abnormal communications between the gastrointestinal tract and the skin which may occur in various disease processes or iatrogenically. Patients who suffer this debilitating condition often manifest signs and symptoms of fluid and electrolyte imbalance, malnutrition and pain. Despite improvements in management and treatment modalities, mortality and morbidity rates remain high. This review aims to report on innovations in negative pressure wound therapies and their role in this specialised field.

**Methods/Interventions:** **METHODS:** A systematic review of studies reporting on negative pressure wound therapy techniques and modalities in ECF treatment was undertaken. The current NICE guidelines were also reviewed as part of this systematic review.

**Results/Outcome(s):** Twenty eight studies met the inclusion criteria using the PRISMA methodology. All included studies were case series. The modalities described were simple VAC dressing techniques and several innovative variations of the same. 2 publications cautioned against the use of negative pressure dressing systems in the setting of an ECF/ECF repair due to the risk of further fistulization.

**Conclusions/Discussion:** There are only case series describing the negative pressure dressing techniques in ECF management. There is a paucity of randomised controlled trials due to the tenuous and protracted treatment requirements for this condition. The current standard of parenteral nutrition, control of sepsis, fluid and electrolyte homeostasis, wound care and a carefully timed definitive surgical procedure, form the core of ECF treatment. Negative pressure dressing techniques act as adjuncts to the current standard therapies in ECF management and

should be used with caution. NICE currently advocates the use of negative pressure wound therapies in selected patients by skilled healthcare professionals which we corroborate via this review.

### ROUTINE CYSTOGRAM IS UNNECESSARY AFTER OPERATION FOR COLOVESICAL FISTULA.

P280

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**Purpose/Background:** Colovesical fistula (CVF) is an uncommon complication of diverticulitis. Substantial variability exists in the intraoperative and postoperative management of this condition. We seek to evaluate the role of bladder leak testing, closed suction drainage, prolonged bladder catheter usage, and routine postoperative cystogram in the management of CVF.

**Methods/Interventions:** This is a retrospective analysis of patients undergoing operation for diverticular CVF at a single academic health center from January 2005 through December 2015. Demographic, operative, and post-operative variables were included for analysis. Malignant or non-diverticular etiologies were excluded. Wilcoxon rank sum test was used for statistical inference.

**Results/Outcome(s):** During the study period, 89 patients underwent operation for diverticular CVF. Of these, 67 (75%) underwent colectomy with primary anastomosis, 7 (8%) colectomy with anastomosis and proximal diversion, and 15 (17%) colectomy with end colostomy. 36 (40%) were performed laparoscopically. Mortality was 5% (4) and overall morbidity was 46% (41). Intraoperative bladder leak test was performed in 36 patients (40%). Sixty-five patients (72%) had a closed-suction drain placed intraoperatively. Sixty-seven patients (75%) had a cystogram and nineteen patients (21%) had a drain creatinine checked prior to Foley catheter or drain removal. 5 (6%) patients developed post-operative bladder leak. Of these, 3 were identified by an elevated drain creatinine and 2 by cystogram. The diagnostic yield of routine cystogram was 3%. All bladder leaks were diagnosed between post-operative day 3 and 11. All patients with bladder leak were suspected to have a leak most commonly due to high abdominal drain output (>350 mL/day). Postoperative bladder leak rate was 3% in patients with intraoperative bladder leak test versus 8% without ( $p=0.6$ ). Of patients with a postoperative bladder leak, none required reoperation and all resolved within 2 months. Median urinary catheter duration in patients without leak was 8 days (interquartile range (IQR): 6-11 days) vs. 36 days (IQR: 31-43 days) in patients with leak ( $p<0.01$ ).

**Conclusions/Discussion:** There is significant heterogeneity in the management of patients undergoing operation



for CVF. Cystogram may add cost and is low yield for routine evaluation for bladder leak after operative repair of CVF. Rather, it should be used selectively in patients with a high suspicion of bladder leak due to high volume or creatinine-rich drain output. Intraoperative bladder leak testing should be considered.

### MANAGEMENT OF DIVERTICULAR FISTULAS: OUTCOMES OF 111 CONSECUTIVE CASES AT A SINGLE INSTITUTION.

P281

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**Purpose/Background:** Laparoscopic sigmoid colectomy has proven to be safe and effective in patients with uncomplicated diverticulitis. However, diverticular fistulas are often treated via laparotomy. The purpose of this study is to examine the outcomes of all patients presenting with non-acute diverticular disease and fistulae, with specific attention to those undergoing colectomy via a minimally invasive approach.

**Methods/Interventions:** This is a single institution retrospective analysis of 111 consecutive patients with diverticular fistulae diagnosed clinically or radiographically at our institution from 2005-2016. Seven patients were not offered laparoscopic colectomy secondary to significant pre-operative co-morbidities and were excluded. The remaining 104 patients were offered laparoscopic sigmoid colectomy with primary anastomosis as the initial approach for elective intervention. All cases were performed by 4 surgeons at a large tertiary care center. Preoperative demographics, intraoperative data, and postoperative outcomes were examined.

**Results/Outcome(s):** Of the 104 patients in our study group, 48% had colovesical fistulas, 28% had colovaginal fistulas, 14% had coloenteric fistulas, 12% had colocutaneous fistulas, and 2% had colocolonic fistulas. The overall conversion rate to laparotomy was 31.7% (n=33). The most common reason for conversion was dense fibrosis. There were no significant differences in pre-operative demographics or mean operative time between the laparoscopic (lap) and conversion to open (con) patients. Overall mean operative time was 156 minutes. Combined post-operative complications occurred in 17.8% of patients (17.4% [n=12] in the lap cohort and 25.8% [n=9] in the con cohort). The most common complication was surgical site infection (10.1%). There was 1 anastomotic leak and 1 mortality at 41 days in the lap cohort. The mean time for return of bowel function was 3.46 +/- 5 days (3.4 days in lap cohort vs 3.5 days in con cohort) and mean hospital length of stay was 6.60 +/- 15 days (6.1 days in lap cohort vs 7.1 days in con cohort).

**Conclusions/Discussion:** Laparoscopic sigmoid colectomy for diverticular fistula is safe, with complication rates comparable to open sigmoid resection. We present the largest series of consecutive laparoscopic sigmoid colectomy for diverticular fistulae. Our conversion rate is somewhat higher than established rates of conversion for elective laparoscopic sigmoid colectomy for diverticular disease. This is not unexpected given the complexity of treating this disease. We believe this to be an acceptable rate that allows the majority of patients to benefit from minimally invasive procedures without additional peri-operative risk. When managed by an experienced colorectal surgeon, laparoscopic sigmoid colectomy in the setting of diverticular fistula is safe, feasible and should be considered for patients who are otherwise candidates for elective surgery.

### CONTEMPORARY MANAGEMENT OF SIGMOID VOLVULUS.

P282

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**Purpose/Background:** Sigmoid volvulus is an uncommon cause of bowel obstruction that historically is associated with high morbidity and mortality. The objective of this study was to evaluate nationwide trends in the operative management and presentation of patients with sigmoid volvulus and to determine the safety of primary anastomosis in patients with sigmoid volvulus.

**Methods/Interventions:** The American College of Surgeons National Surgical Quality Improvement Project from 2012-2015 was queried for patients with intestinal volvulus who underwent left-sided colonic resection. Patient level factors, operative characteristics, and 30-day outcomes were examined. A propensity score matched analysis was then performed to compare patients with sigmoid volvulus undergoing colectomy with primary anastomosis without proximal diversion to those undergoing colectomy with end colostomy.

**Results/Outcome(s):** In total, 2,538 patients with sigmoid volvulus were included for analysis. Patients undergoing colectomy for sigmoid volvulus had a median age of 68 years (interquartile range (IQR): 55-80) and 52% were male. 8% presented from a nursing facility and 21% were not living independently preoperatively. 51% of operations were performed emergently. 1,813 (71%) patients underwent colectomy with anastomosis, 240 (10%) patients colectomy with anastomosis and proximal diversion, and 485 (19%) patients colectomy with end colostomy. Overall 30-day mortality and morbidity were 5% and 40%. One-third of patients were discharged to a nursing facility. After propensity score matching, 440 patients who underwent colectomy with primary anastomosis were compared

to 440 patients who underwent colectomy with end colostomy. Mortality, overall morbidity, serious morbidity, readmission rate, operative time, and length of stay were similar between the groups after matching (Table). Anastomotic leak occurred in 6.2% of patients undergoing colectomy and primary anastomosis with an increased rate of organ space surgical site infections in these patients (Table). 12% more patients undergoing a colectomy with end colostomy were discharged to a nursing facility (Table).

**Conclusions/Discussion:** Sigmoid volvulus occurs in elderly and debilitated patients. Operation is associated with significant morbidity, mortality, and lifestyle implications with one third of patients being discharged to a facility. Anastomosis without proximal diversion in patients with sigmoid volvulus results in similar outcomes to colectomy with end colostomy but carries significant risk of anastomotic leak and reoperation.

#### PRE-DISCHARGE ILEOSTOMY OUTPUT PREDICTS DEHYDRATION ASSOCIATED READMISSIONS.

P283

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**Purpose/Background:** Readmission rates 60 days following ileostomy creation is high, and the most common cause of readmission is dehydration. We examined factors associated with readmission due to dehydration. Identification and modification of risk factors prior to discharge may help decrease post ileostomy dehydration and subsequent readmission.

**Methods/Interventions:** A retrospective cohort chart review was performed identifying patients who had ileostomies created between 06/03/2009 and 06/01/2015 at

UVM Medical Center. The following parameters were examined; race, ethnicity, age, gender, procedure type, loop vs end ileostomy, length of ileum resected, length of hospital stay, IV fluid volume administered 24 hrs prior to discharge, PO intake 24 hrs prior to discharge, and ileostomy output 24 hrs prior to discharge. Ileostomy output and oral intake in final 24 hrs of index admission were divided into quartiles based on distribution volumes; For oral intake Q1=0mL~757.5mL, Q2=757.5mL~1150mL, Q3=1150mL~1500mL, Q4=>1500mL., For ileostomy output Q1=0mL~320mL, Q2=320mL~600mL, Q3=600mL~1050mL, Q4=>1050mL.

**Results/Outcome(s):** Ileostomies were created in 335 patients, including 215 diverting loop ileostomies and 120 end ileostomies. In the cohort of 335 patients, there were 29 readmissions for other reasons and those patients were excluded from analysis. The final cohort therefore consisted of 306 patients; of these 72 (23.5%) patients were readmitted within 60 days due to dehydration. Average length of stay for index procedure was 13 days. Type of ileostomy, length of small bowel resected, oral intake and volume of IV fluid administered in 24 hours prior to discharge all failed to predict readmission. Ileostomy output during final 24 hours of index admission in the 4<sup>th</sup> quartile (>1050 mL) predicted dehydration related readmission (RR = 1.82, 95% CI 1/06-3.11, Q4 vs Q1 p=0.03)

**Conclusions/Discussion:** Following ileostomy creation readmission due to dehydration is a common problem. (72/306 patients; 23.5%). High ileostomy output in the 24 hours prior to discharge is the only factor predictive of readmission. Delaying discharge until ileostomy output decreases below 1 liter per 24 hours may potentially decrease readmission rates. Patient counseling regarding oral intake and stoma output may also be beneficial, although not studied in this project.

#### P282 Rates of morbidity after propensity score matching for patients with sigmoid volvulus undergoing colectomy.

	Colectomy with Primary Anastomosis: n (%)	Colectomy with End Colostomy n (%)	p
Mortality	40 (9.1%)	40 (9.1%)	1.0
Overall Morbidity	223 (50.7%)	201 (45.7%)	0.14
Serious Morbidity	148 (33.6%)	130 (29.6%)	0.19
Anastomotic Leak*	14 (6.2%)	-	NA
Organ Space Infection	26 (5.9%)	9 (2.1%)	<0.01
30-Day Reoperation	50 (11.4%)	34 (7.7%)	0.07
Discharged to Rehab Facility	177 (43.6%)	229 (55.2%)	<0.01
Readmission Rate	58 (13.2%)	55 (12.5%)	0.77
Operative Time (median (IQR**))	92 (67-122)	92 (70-127)	0.38
Length of Stay (Median (IQR**))	8 (5-13)	8 (5-13)	0.58

\*485 patients had data on anastomotic leak rates. This data is only included in facilities that submit data via the colectomy targeted dataset. \*\*IQR=Interquartile Range

## SIGNIFICANCE OF PERSISTENT PERITONITIS AFTER DAMAGE CONTROL SURGERY IN PATIENTS WITH ACUTE PERFORATED DIVERTICULAR DISEASE.

P284

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**Purpose/Background:** Damage control surgery (DCS) has been introduced for management of perforated diverticular disease of the sigmoid colon by some centers. The aim of this retrospective cohort study was to evaluate the significance of persistent peritonitis discovered at the time of second laparotomy following DCS.

**Methods/Interventions:** All patients who underwent DCS for acute perforated diverticular disease of the sigmoid colon between 2011 and 2016 were included. The DCS included a two stage procedure: limited resection of the diseased colonic segment, closure of oral and aboral colon, and application of an abdominal vacuum at the initial surgery followed by definite reconstruction (anastomosis or Hartmann's procedure) at second laparotomy 24-48 h later.

**Results/Outcome(s):** Fifty-five patients (mean age 68 years) underwent DCS. At the second laparotomy, 10 patients underwent Hartmann's procedure and an anastomosis was constructed in 45 patients. Fourteen of latter patients received a diverting ileostomy. An anastomotic leak was treated by an ileostomy in further 4 patients. Thus, 28 patients (51%) had some type of stoma at the end of the hospital stay. At the time of second laparotomy, persistent peritonitis (PP) was discovered in 28 patients (51%): it was generalized in 10 patients and localized in 18. The overall postoperative complication rate (50% vs. 22%,  $P=0.05$ ) and mortality (18% vs. 0%,  $P=0.051$ ) was higher in patients with PP as compared to patients without PP. The mortality was highest when PP was generalized (40%). Also, length of hospital stay was increased in patients with PP (27 days vs. 18 days,  $P=0.015$ ). Patients with PP were discharged from hospital significantly more often with a stoma than patients without PP (71% vs. 30%,  $P=0.003$ ). The mean number of surgeries performed during the initial hospital stay was also increased in patients with PP (3.6 vs. 2.2,  $P=0.003$ ). At the end of the follow-up period, 36%

### P283 Ileostomy Output in Final 24hr vs Readmission Rate

Ileostomy Output in 24 hrs prior to discharge	Readmission Rate
Q1 (0mL~320mL)	17/94 18.1%
Q2 (320mL~600mL)	13/70 18.6%
Q3 (600mL~1050mL)	17/66 25.8%
Q4 (1050mL~)	25/76 32.9%

of patients with PP still had a stoma as opposed to 11% of patients without PP ( $P=0.055$ ).

**Conclusions/Discussion:** In patients undergoing DCS, persistence of peritonitis at the time of the second laparotomy is a strong predictor of poor short- and long-term outcome.

## RECTAL PROLAPSE REPAIR WITH ABDOMINAL FIXATION IS FEASIBLE UNDER EPIDURAL OR SEDATION/LOCAL ANESTHESIA: A PROSPECTIVE PILOT STUDY IN ELDERLY SUBJECTS.

P285

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**Purpose/Background:** The aim of this study was to evaluate the safety and feasibility of an abdominal approach to rectal prolapse (RP) repair under epidural or sedation/local anesthesia. Further, to evaluate short and long-term clinical outcomes after this novel procedure in elderly patients (>75).

**Methods/Interventions:** Prospective pilot study with 10 patients, male and female above 75 years of age with RP. The anesthesia was epidural or sedation/local. *Surgery:* After evaluation with flexible colonoscope, the rectum was lifted and positioned for fixation against the suprapubic abdominal wall using sigmoidoscopy. Next 6-to-8 2-0 Polypropylene sutures were placed via a small incision (<5 cm) through the abdominal wall into a small piece gortex mesh, anesthetizing the area with local. Outcomes measured were: intraoperative complications, surgery

### P285 Results

Variable	N=9
Age yrs. median (range)	82(75-96)
ASA median (range)	3(2-3)
Comorbidity	
Hypertension	5
Diabetes	3
Anesthesia Type	
Epidural	7
Spinal	1
MAC	1
Intubation during surgery	0
Operative time min	65(52-78)
Postoperative Stay in Hospital, days	3(2-10)
Follow up 30 days	9
Follow up 12 month	7
Recurrence 30 days	0
Recurrence 12 months	1

completion without intubation, postoperative complications, recurrence at 30 days, 12 months.

**Results/Outcome(s):** Nine female patients above 75 years of age were enrolled (Table). One patient recurred within 6 months and subsequently underwent transanal surgical repair of RP. One patient died at 3 months unrelated to the procedure. No other anesthetic, intraoperative, or postoperative complications were observed.

**Conclusions/Discussion:** Abdominal RP repair under epidural or sedation/local anesthesia appears feasible and safe in elderly patients and may, in the future, provide an effective alternative to current treatment options for RP, avoiding a general anesthesia and pelvic dissection.

### “HOW ABOUT THAT COLON BUNDLE!” USE OF A SURVEY TOOL TO ENGAGE SURGEONS IN REDUCING SURGICAL SITE INFECTIONS FOR COLON SURGERY.

P286

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**Purpose/Background:** The Advanced Colon Surgery Bundle Workgroup is a multidisciplinary team charged with reducing Surgical Site Infections (SSI) related to Colorectal Surgery at John T. Mather Memorial Hospital. Timely use of a survey tool to inform, consult, involve, collaborate with, and empower our surgeons resulted in widespread buy-in by this critical group of stakeholders.

**Methods/Interventions:** After initial attempts to inform surgeons of the implementation of a bundle of evidence-based perioperative interventions to reduce surgical site infections fell short, a brief survey was sent to each surgeon, collecting answers as discrete data fields as well as open-ended questions with opportunities to add free-text responses. The responses were discussed at a Department of Surgery Meeting, and an action plan developed around surgeons' input.

**Results/Outcome(s):** 100% compliance with surgeon-dependent colon bundle elements for all elective colon surgery cases. Improved surgeon participation in surgical debriefing, including wound classification/ risk stratification for SSI. 50% decrease in overall Colon SIR (Standardized Infection Rate) in 6 months.

**Conclusions/Discussion:** Demonstrated use of a survey tool to inform, consult, involve, collaborate with, and empower surgeons to participate in quality and process improvement. Future studies could measure use with other quality improvement stakeholders, from hospital leadership to patients.

### PARASTOMAL HERNIA REPAIR USING AN OPEN-FIRST HYBRID TECHNIQUE.

P287

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**Purpose/Background:** One of the most common complications of stoma creation is parastomal hernia, with incidence up to 48%. Indications for surgical repair include pain, poor fitting ostomy appliance, and bowel obstruction. A variety of techniques for repair have been described in the literature, including a hybrid technique. Our proposed hybrid technique utilizes an open-first approach.

**Methods/Interventions:** Our technique begins with identifying the fascial defect and creating a transverse incision medial to the ostomy. Open approach here facilitates dissection and isolation of the hernia sac. Hernia contents are reduced and the sac excised. Adhesiolysis and trocar placement are performed under direct visualization. The fascial edges are reapproximated in interrupted fashion. The subcutaneous tissue and skin is reapproximated, and the mucocutaneous junction of the ostomy reattached. The mesh is easily prepared and inserted into the abdomen prior to closure of the defect. The repair is then reinforced using a laparoscopic intraperitoneal Sugarbaker technique. The mesh is positioned to create a stair-step configuration of the colostomy while providing sufficient mesh underlap of the defect. Transfacial sutures are used to secure the mesh, which displaces the stoma laterally. Pneumoperitoneum is then released, and trocar and puncture sites closed.

**Results/Outcome(s):** 1. Adhesiolysis & reduction of contents within the hernia sac during the open portion decreased case time and difficulty while improving safety. 2. Mesh was easier to position intra-abdominally through open fascia. 3. Bowel and adjacent soft tissues injuries were decreased with direct trocar visualization. 4. Use of a partial medial takedown of the stoma minimizes traumatic injury.

**Conclusions/Discussion:** Parastomal hernias remain a common problem after colostomy or ileostomy creation. Repair using new hybrid approaches combine both open and laparoscopic techniques. Our method describes advantages over other hybrid and straight laparoscopic procedures that are safe and effective. Specific advantages include 1) isolation and excision of hernia sac, 2) ease of reduction of hernia contents, 3) faster adhesiolysis and intraabdominal placement of mesh, 4) safer trocar placement, and 5) preservation of stoma. Parastomal hernias result from the same physical forces causing other abdominal wall hernias. We believe that adhering to the core principles of hernia surgery in parastomal hernia repair will significantly improve success of this repair. These core principles are performed in our method, all of which are paramount to the superiority of our procedure.

## LAPAROSCOPIC RIGHT COLECTOMY WITH EXTRACORPOREAL ANASTOMOSIS HAS HIGHER MORBIDITY COMPARED TO INTRACORPOREAL ANASTOMOSIS?

P288

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**Purpose/Background:** Laparoscopic right colectomy is a standardized procedure. In the beginning of the laparoscopic experience surgeons preferred the extracorporeal anastomosis (ECA). Recently, the preference of intracorporeal anastomosis (ICA) is increasing between coloproctologists due to better esthetic results and reduced hernia risk. **Objective:** To compare perioperative morbidity of intracorporeal anastomosis versus extracorporeal anastomosis in laparoscopic right colectomy

**Methods/Interventions:** Consecutive 82 patients who underwent surgical laparoscopic right colectomy between 2012 and 2016 were retrospectively reviewed from a prospectively maintained database. The primary outcome was 30-day morbidity, recorded using de Clavien-Dindo classification system. Major complication was defined as Clavien-Dindo classification  $\geq 3$ . Statistical analysis was based on the software SPSS®.

**Results/Outcome(s):** From 82 patients, 24 had ICA and 58 had ECA. Both populations had no difference as related to age, comorbidities, Body Mass Index (BMI), preoperative hemoglobin or American Society of Anesthesiology (ASA) classification. Overall, 56 (68.3%) patients had no complications, 21 (25.6%) had minor and 5 (6%) had major complications. There were no conversions to either anastomosis performed. The 30-day mortality was 2 (2.4%). Reoperation was necessary for 1 (1.2%) patient, and anastomotic leakage occurred in 1 (1.2%) patient. The comparison between ICA and ECA did not achieve statistic relevance in any of the categories analyzed. There was a tendency of minor operative time of the ECA group (199 vs 223 minutes,  $p=0.76$ ).

**Conclusions/Discussion:** Laparoscopic right colectomy is a low morbidity surgical procedure. Both ECA and ICA are safe options, leaving the choice of the anastomotic technique to the surgeon.

## EVALUATION OF THE SAFETY OF BARBED SUTURE IN ROBOTIC ASCENDING COLECTOMY WITH INTRACORPOREAL ISOPERISTALTIC ILEOCOLIC ANASTOMOSIS.

P289

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**Purpose/Background:** Barbed unidirectional suture has been used to perform upper gastrointestinal anastomoses. Its safety and efficacy has not yet been investigated in a dedicated colorectal series. We report our experience with the use of barbed suture for closure of the common enterotomy in robotic assisted ascending colectomy with intracorporeal anastomosis.

**Methods/Interventions:** A retrospective analysis of a single surgeon's robotic ascending colectomies was analyzed from January 2015 to October of 2016. Barbed suture was used to close the common enterotomy in a standard two layer fashion for all isoperistaltic ileocolic anastomoses. The primary endpoint was presence or absence of anastomotic leak. Demographic information, intraoperative data, postoperative complications and readmissions were also evaluated.

**Results/Outcome(s):** Fifty-four patients underwent robotic ascending colectomy with intracorporeal isoperistaltic ileocolic anastomosis. No cases required conversion to open surgery. There were no anastomotic leaks. One patient was managed for respiratory distress postoperatively. Two patients had fevers but evaluation, including CT imaging, did not indicate anastomotic leaks or abdominal pathology for these patients. They recovered without further incident. One patient was readmitted with ileus that resolved with conservative management.

**Conclusions/Discussion:** To date, there are no published studies reporting the safety of barbed suture on colorectal robotic procedures. We demonstrate that double layer closure with barbed suture is a safe operative method. In this patient series, it has not been associated with anastomotic leak or intra abdominal complications.

## TEMPORAL CHANGES IN THE MANAGEMENT OF PATIENTS WITH COMPLICATED DIVERTICULITIS IN A MAJOR TERTIARY INSTITUTION.

P290

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**Purpose/Background:** Over the past 2 decades, there has been a reduction in the number of patients being managed operatively for complicated diverticulitis. In the patients requiring emergency surgery in diverticulitis, there has been mounting evidence that primary anastomosis with

or without ileostomy is a safe alternative to Hartmann's procedure in patients without florid sepsis. The aim of this study was to analyse if this increasingly strong evidence has had an impact on patient management in a major tertiary institution.

**Methods/Interventions:** A retrospective review of presentations of acute diverticulitis to a major tertiary referral hospital in Sydney, Australia, was undertaken. The study period was between January 2001 to December 2013.

**Results/Outcome(s):** During The study period there were 812 presentations with acute diverticulitis. 72 patients (89%) were managed operatively. They were more likely to be older (median age 66 vs 57,  $p = 0.001$ ), have more co-morbidities (33% vs 23.0%, with Charlson score 2+,  $p = 0.051$ ) and have complicated diverticulitis (89% vs 27.6%,  $p < 0.0001$ ). There were 129 patients (16.8%) with Hinchey 1, 78 patients (10.2%) with Hinchey 2, and 36 patients (4.7%) with Hinchey 3 and 4 diverticulitis. The rate of operative management in patients with Hinchey 1 and 2 was unchanged over the study period (9% in 2001-05, 9% in 2006-08, 2% in 2009-11, 8% in 2012-13.  $P = 0.427$ ). The primary anastomosis rate in these patients had increased during this period (17% in 2001-05, 33% in 2006-08, 40% in 2009-11, and 57% in 2012-13.  $P = 0.070$ ). 68 patients (8%) had medical complications and 27 patients (38% of patients managed surgically) had surgical complications. The mortality rate was 1.5% overall. There was a reduction in mortality 3.9% in 2001-05 to 1.6% in 2012-13,  $p = 0.04$ ) but no significant change in medical or surgical complications.

**Conclusions/Discussion:** Over this 13-year period, there was an increase in the total number of presentations with acute diverticulitis with an increase in the proportion of patients with uncomplicated disease. The rate of patients requiring operative management for Hinchey 1 and 2 had remained unchanged, however these patients were more likely to have a primary anastomosis. The morbidity rate was unchanged but there was an improvement in mortality rates. Reasons for these observed changes could include improvements in perioperative care and the mounting evidence that primary anastomosis is safe in selected patients requiring emergency surgery in diverticulitis.

#### QUALITY OF LIFE TRENDS AFTER COLORECTAL CANCER SURGERY.

P291

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**Purpose/Background:** Patients diagnosed with colorectal cancer undergo surgery as well as chemoradiotherapy. Such interventions may have oncologic efficacy, but often also lead to a reduction in quality of life (QoL). We conducted this study to evaluate trends in the quality

of life of patients from the time of surgery for colorectal cancer.

**Methods/Interventions:** A cross-sectional study was conducted on 91 consecutive patients who presented to the outpatient clinic with a history of colorectal cancer who had undergone surgery. All patients were administered the EORTC QLQ-C30 questionnaire. Duration from the patient's surgery was recorded. The Global Health Status of the questionnaire, which measures QoL was determined. QoL was scored on a range of 0 to 100, in which 100 denotes perfect QoL.

**Results/Outcome(s):** We recorded the scores for 21 (23.1%) patients within 3 months of surgery, 11 (12.1%) patients between 4 – 6 months, and another 11 (12.1%) patients between 9 – 12 months. Two patients had surgery between 10 – 12 months ago, while 7 (7.7%) patients presented in their second year from surgery, and 39 (42.9%) patients were interviewed more than two years after surgery. QoL scores was lowest in the immediate three months following surgery (mean 62.7). This gradually improves to a peak mean QoL of 79.2 around 12 months after surgery. Following this, QoL tapers but not as low as the immediate post-operative period (70.2 in the second year, and 71.6 after the second year).

**Conclusions/Discussion:** Patients experiences the worst QoL in the immediate post-operative period although this recovers by the end of the first year. Following this, QoL decreases but remains constant at levels higher than the immediate post-operative period. Interventions could be implemented in the immediate period after surgery to minimise the impact on their QoL.

#### ACCURACY OF MRI IN ASSESSING RESPONSE TO NEOADJUVANT THERAPY IN LOCALLY ADVANCED RECTAL CANCER.

P292

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**Purpose/Background:** Magnetic Resonance Imaging (MRI) is currently the modality of choice for primary staging of rectal cancers. It is also the modality of choice in re-staging locally advanced rectal cancers (LARC) after neoadjuvant chemo-radiotherapy treatment (NCRT). However, the accuracy of MRI in assessing response to NCRT in LARC and in identifying patients with complete response (CR) has been questioned, and inter-rater agreement on MRI staging has been variable. This retrospective study assessed the accuracy of MRI in restaging LARC after NCRT and in identifying patients with complete response. Accuracy of MRI in assessing T stage and tumour regression grade (TRG) was calculated at different time intervals after NCRT. Inter-rater variability between reporting radiologists was also assessed.

**Methods/Interventions:** All patients with LARC who underwent NCRT in Colchester University Hospital between January 2003 and July 2014 were eligible. The accuracy of MRI at different time intervals after NCRT was compared. Two radiologists with 7 and 2 years experience in GI radiology blindly re-staged all the MRI scans. Inter-rater concordance was calculated by Cohen's weighted Kappa. Histo-pathological assessment and Mandard's TRG were considered to be the gold standard. Accuracy of T staging and TRG were assessed using weighted Kappa.

**Results/Outcome(s):** 114 patients were included in this study. 79 patients (69.3%) experienced downstaging by a whole T stage or more when the first post-treatment MRI scan was performed at a median of 6.1 weeks (range: 3.0 – 11.7) after completion of NCRT. A further 37 patients (32.5%) experienced downstaging by the time the second post-treatment scan was performed at a median of 10.4 weeks (range: 4.0 – 15.1). Inter-rater agreement of T stage on the pre-treatment scans, showed fair agreement (Kappa value 0.272). There was no inter-rater agreement on assessment of the post treatment scans (Kappa value 0.141). There was fair agreement between T stage and histology on assessment of the first post-treatment MRI scan (Kappa 0.244,  $p < 0.001$ ). T stage was correctly classified in 46.5% of cases. There was higher concordance and accuracy with the second post treatment scan at 10.4 weeks (Kappa value 0.439 - moderate agreement). T stage in the second post-treatment MRI was accurate in 59.3% of cases. In assessing TRG, the second post-treatment MRI scan performed at a median of 10.4 weeks after completion of NCRT was significantly more accurate than the first post-treatment MRI performed at a median of 6.1 weeks (Kappa values of 0.187 vs. 0.090 ( $p = 0.027$ )).

**Conclusions/Discussion:** Our findings consistently showed that MRI in LARC was more accurate in assessing response to NCRT at 10 weeks, rather than the traditionally accepted assessment at 6 weeks post-NCRT. Due to consistently low inter-rater concordance at 6 weeks, a systematic unified approach in reporting post-treatment MRI scans should be used at 10 weeks.

#### DEMOGRAPHIC CHANGES IN THE PRESENTATION OF COLORECTAL CANCER IN NEW ZEALAND 1995-2012.

P293

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**Purpose/Background:** New Zealand (NZ) is an unscreened colorectal cancer population, and has amongst the highest rates of colorectal cancer (CRC) rates in the world. Internationally, there has been trends to a left-to-right shift in CRC rates and newer evidence suggesting a higher rate of rectal cancer amongst younger patients. The aim of this study was to determine current trends in right-

left-sided colon, and rectal cancer incidence by age, and gender in NZ.

**Methods/Interventions:** We obtained data from the NZ Cancer Registry and linked it to population data from the time period 1995 to 2012. Cancers were divided into proximal (caecum to the splenic flexure), distal (descending to sigmoid colon), and rectal (rectosigmoid and rectum). Patients were categorised by gender and age. The age was stratified into less than 50 years, between 50 and 80 years, and 80 years and over.

**Results/Outcome(s):** Males had a higher incidence of CRC at all sites and age. Older patients had a higher incidence of CRC. However, in terms of trends, both male and female patients younger than 50 years, showed an increased incidence in rectal cancer. Patients between 50 and 80 years had reduction in incidence at all sites. For those aged 80 and over, only the proximal lesions were noted to be increasing in incidence.

**Conclusions/Discussion:** We have identified an increasing incidence of rectal cancer amongst younger patients, a reduction at all sites in those aged 50 to 80, and an increase in proximal lesions in the elderly.

#### DIAGNOSTIC VALUE OF <sup>18</sup>F-FLUORODE-OXYGLUCOSE (FDG) POSITRON EMISSION TOMOGRAPHY (PET) /CT FOR LATERAL PELVIC LYMPH NODE METASTASIS IN RECTAL CANCER TREATED WITH PREOPERATIVE CHEMORADIOTHERAPY.

P294

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**Purpose/Background:** Recently, it has been suggested that lateral pelvic lymph node (LPN) dissection can benefit rectal cancer patients even after preoperative chemoradiotherapy (CRT); however, precise diagnosis of LPN metastasis has been reported to be challenging. The aim of this study is elucidate the diagnostic value of <sup>18</sup>F-fluorodeoxyglucose (FDG) positron emission tomography (PET) /CT for LPN metastasis in rectal cancer treated with preoperative CRT.

**Methods/Interventions:** A total of 113 rectal cancer patients were treated with preoperative CRT and radical surgery from 2012 to 2015 at the University of Tokyo. Among them, 25 patients with enlarged ( $\geq 8$  mm) LPNs before CRT were treated with LPN dissection. The size and the maximum standard uptake value (SUVmax) of LPNs were measured after CRT by CT or MRI, and PET/CT, and were individually correlated to their pathological status in the resected specimen.

**Results/Outcome(s):** A total of 28 LPNs were examined, and 12 LPNs (42.9%) were pathologically positive

for metastasis. The size after CRT of metastatic LPNs was significantly larger than that of non-metastatic LPNs ( $14.8 \pm 7.4$  mm vs.  $5.6 \pm 3.2$  mm,  $p < 0.01$ ). The SUVmax after CRT of metastatic LPNs was significantly higher than that of non-metastatic LPNs ( $2.2 \pm 1.3$  vs.  $1.2 \pm 0.3$ ,  $p < 0.01$ ). Receiver operator characteristic analysis indicated the optimal cut off values of 12mm and 1.6 for size and SUVmax, and the accuracies for the diagnosis of metastasis were 82.1% and 85.7%, respectively. A scatter plot of the size and the SUVmax of LPNs is shown in Figure 1. When either of size  $\geq 12$  mm or SUVmax  $\geq 1.6$  was recognized, the LPNs were predicted as pathologically metastatic with the accuracy of 92.9%.

**Conclusions/Discussion:** Diagnostic value of the SUVmax after CRT for LPN metastasis was as good as the size after CRT, and the combination of the size and the SUVmax yielded a higher accuracy for the diagnosis of metastatic LPNs. PET/CT might serve as a diagnostic modality for LPN metastasis complementary to CT and MRI.

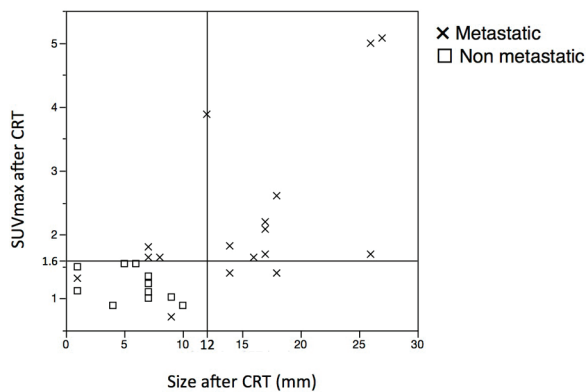


Figure 1. Scatter plot of the size and the SUVmax of lateral pelvic lymph nodes after chemoradiotherapy

#### OUTCOME OF LOW-GRADE MUCINOUS APPENDICEAL NEOPLASMS WITH REMOTE ACCELLULAR MUCINOUS PERITONEAL DEPOSITS.

P295

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**Purpose/Background:** Mucinous appendiceal neoplasms range from benign low-grade cystic neoplasms to high-grade invasive disease. Occasionally, low-grade mucinous appendiceal neoplasms (LGMAN) present with mucinous peritoneal deposits (MPD) localized to periappendiceal tissue or diffuse throughout the peritoneum. Cytoreductive surgery (CRS), +/- intraperitoneal chemotherapy (IPC) may over-treat some patients, particularly those with acellular MPD (AMPD). We report outcomes for patients with

LGMAN with MPD remote to the appendix, evaluating the prognostic relevance of cellularity of peritoneal mucin.

**Methods/Interventions:** Patients with LGMAN and MPD seen between 1990-2015 were included. Data were collected on index diagnostic procedure, treatment recommended/administered and disease outcomes.

**Results/Outcome(s):** 71 pts with LGMAN and MPD were identified and 48 included in the analysis (23 excluded as FU <12 months). These were 31F and 17M with median age of 49yrs (28-88yrs). Initial sampling was with biopsy in 6, appendectomy or hysterectomy/BSO in 25 or extended resection in 17. Nineteen had CMPD and 29 had AMPD. Radiologically visible disease was present in 34 pts (71% - 16 AMPD/18 CMPD). Initial recommendation was CRS within 6 months in 40 and observation in 8 pts. 2/40 pursued treatment elsewhere. 5/38 did not undergo CRS (2 had no evidence of disease at laparoscopy and 3 had extensive disease). Of those undergoing CRS, complete CR was possible in 30/33 (91%). All 3 incomplete CRS cases had CMPD. IPC was used as an adjunct to CRS in 27 pts. Median FU was 4 yrs (1-17), during which there were 8 deaths, 6 from disease. All 6 deaths were in the CMPD group. During the follow-up period, 11/48 pts had progression of disease (POD); 10/19 in the CMPD group and 1/29 in the AMPD group who did so 14yrs after appendectomy. In those undergoing CRS, 9/38 had POD.

**Conclusions/Discussion:** Cellularity of MPD is an important determinant of disease outcome in LGMAN. In this series, no disease specific mortality was seen in the AMPD group with only 1 recurrence at 14 yrs. These results support a strategy of observation rather than CRS for selected patients with AMPD given the low rates of progression.

#### LYMPH NODE REGRESSION- GRADE ACTS AS A POTENTIAL PROGNOSTIC INDICATOR IN RECTAL CANCER AFTER NEOADJUVANT THERAPY AND RADICAL SURGERY.

P296

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**Purpose/Background:** Tumor regression grade exist in not only primary tumor but also lymph nodes after chemoradiotherapy. The aim of this study was to estimate a new scoring system in the consideration of lymph node statues which could be a potential prognostic indicator in patients with rectal cancer after neoadjuvant chemoradiotherapy followed radical surgery.

**Methods/Interventions:** The project was a retrospective cohort study from Jan 2005 to Dec 2013. A total of 178 patients with rectal cancer who received neoadjuvant chemoradiotherapy followed radical resection were included. Both of primary tumor regression grade and lymph node regression grade were divided into grade 1 to



5 basing on the percentage of fibrosis and the presence of residual tumor amount. The lower grade meant the better response to chemoradiotherapy. Then, the impacts of primary tumor regression grade and lymph node regression grade in each specimen on survival were analyzed respectively. Survival analyses were carried out according to the Kaplan-Meier method and significance testing was done by the log rank test. Multivariate analysis was performed using Cox proportional hazard models for mortality and recurrence.

**Results/Outcome(s):** There were 23 patients lost follow up and the baseline data were obtained from 155 patients. Overall, 51 (32.9%) patients suffered recurrence and 34 (21.9%) patients died during follow up. The 5-year overall survival was 66.1% and 5-year disease free survival was 59.5%. Both primary tumor regression grade and lymph node regression grade could be the predictors of prognosis in patients with rectal cancer after neoadjuvant chemoradiotherapy. For the whole patients, primary tumor regression grade had no significance in overall survival ( $P=0.11$ ) and disease free survival ( $P=0.18$ ). Of the 92 patients with ypN0, however, primary tumor regression grade had significant difference in disease free survival ( $P=0.01$ ). Patients without lymph node metastasis before neoadjuvant chemoradiotherapy were excluded in further study. And the result showed that lymph node regression grade had significant difference in overall survival ( $P=0.001$ ) and disease free survival ( $P=0.04$ ). Furthermore, lymph node regression grade was found to be an independent risk factor for mortality (Hazard Ratio 1.533, 95%CI 1.223-1.922;  $P=0.0002$ ) and recurrence (Hazard Ratio 1.278, 95%CI 1.061-1.539;  $P=0.01$ ).

**Conclusions/Discussion:** For the patients with rectal cancer after neoadjuvant chemoradiotherapy, primary tumor regression grade was only found to be a predictor for outcomes in patients without lymph node metastasis. Moreover, lymph node regression grade could act as a potential prognostic indicators in patients with lymph node metastasis before neoadjuvant chemoradiotherapy.

## CLINICAL OUTCOMES FOLLOWING ELECTIVE COLECTOMY INFLUENCED BY TUMOR PATHOLOGY.

P297

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**Purpose/Background:** Indications for laparoscopic and open colectomies include cancer and polyps not amenable to colonoscopic resection. Postoperative complications have been linked to patient factors including age, BMI, functional status, preoperative steroid use and comorbid conditions. Clinical outcomes based on operative indication have yet to be investigated. In effort to improve preoperative counseling to these patient groups, we conducted a retrospective cohort study using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP).

**Methods/Interventions:** Patients from the ACS-NSQIP database who underwent laparoscopic or open colectomy between 2005 and 2014 were identified. ICD-9 codes were utilized to identify patients with a diagnosis of cancer or polyp. A multivariable analysis was performed using: age, sex, prior abdominal operations, ASA classification, history of congestive heart failure, myocardial infarction, diabetes, COPD, smoking, steroid use, bleeding disorder and laparoscopic versus open approach to calculate adjusted rates. Adverse clinical outcomes were calculated for raw and adjusted rates. Statistical significance was set at  $P < 0.05$ .

**Results/Outcome(s):** 137,297 patients underwent laparoscopic or open colectomy. When comparing adjusted occurrence rates of those with a diagnosis of a polyp ( $N=17,858$ ) to those with cancer ( $N=49,706$ ), patients with polyps were less likely to suffer from PNA (1.75%, 2.90%), DVT (0.88%, 1.46%), PE (0.45%, 0.83%), require perioperative blood transfusion (1.51%, 8.16%), return to OR (3.86%, 4.85%), readmission within 30 days (8.23%, 11.06%) and death within 30 days (0.97%, 3.01%) (Table 1). Length of stay was 5.77 days in those with a polyp versus

P297 Table 1

Outcome	Benign Neoplasm:		Malignant Neoplasm:		P values:	
	Raw	Adjusted (N=7,088)	Raw	Adjusted (N=17,420)	Raw	Adjusted
PNA	1.54%	1.75%	2.69%	2.90%	<0.001	<0.001
DVT	0.76%	0.88%	1.43%	1.46%	<0.001	<0.001
PE	0.38%	0.45%	0.86%	0.83%	<0.001	<0.001
Perioperative transfusion	2.51%	1.51%	8.75%	8.16%	<0.001	<0.001
Return to OR	3.57%	3.86%	4.63%	4.85%	<0.001	<0.001
Readmission	7.36%	8.23%	9.31%	11.06%	<0.001	<0.001
Death	0.84%	0.97%	2.64%	3.01%	<0.001	<0.001
Length of Stay	5.57 days	5.77 days	8.06 days	8.32 days	<0.001	<0.001
Anastomotic Leak	2.34%	NA*	3.01%	NA*	0.016	

\*NA= not available as this is a new NSQIP variable as of 2012 and the N is not sufficient for a multivariable analysis

8.32 days in the cancer group. Differences in both raw and adjusted rates were statistically significant. Raw anastomotic leak rates were lower in the polyp group (2.34% vs 3.01%,  $p=.016$ ).

**Conclusions/Discussion:** Patients undergoing colectomy for a polyp are at decreased risk of many adverse postoperative events compared to those undergoing colectomy for cancer, even when adjusted for operative approach and comorbid conditions. Similar trends persisted when right and left colectomies were analyzed individually. This information may lend support for earlier operative intervention over repeat colonoscopic excisions for patient with these difficult polyps. This data also supports enhancing preoperative measures to decrease postoperative complications in those with malignant lesions. Improving accuracy of risk stratification for elective surgical procedures is necessary to improve outcomes and adequately counsel patients on expectations and concerns.

#### ADVANCED DUODENAL AND AMPULLARY ADENOMATOSIS IN A BRAZILIAN POPULATION OF FAMILIAL ADENOMATOUS POLYPOSIS: PROSPECTIVE CLINICAL AND MOLECULAR STUDY.

P298

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**Purpose/Background:** The aim of this study was to determine clinical and molecular characteristics associated with the development of advanced duodenal polyposis, jejunal polyposis and ampullary adenomas in a Brazilian population of patients with Familial Adenomatous Polyposis (FAP).

**Methods/Interventions:** This is a single referral center, prospective study of a cohort of 62 patients related to 46 families with diagnosis of FAP. All patients were evaluated with lateral and forward view gastroduodenoscopy. Duodenal polyposis was classified according to Spigelman staging system and ampullary adenomas were also identified. Patients graded as Spigelman III or IV underwent balloon assisted enteroscopy. Non-ampullary duodenal polyposis was stratified into two groups: Spigelman 0 to II, and stage III and IV. Additionally patients were divided into two groups according to presence of ampullary adenomas. These groups were related to clinical variables: gender, age, family history of FAP, type of colorectal surgery, and type of colorectal polyposis. Molecular evaluation was performed in 8 unrelated probands who presented advanced duodenal polyposis Spigelman III or IV, and/or ampullary adenomas. Mutations in 94 genes and 284 polymorphisms associated with predisposition to the development of cancer were investigated. The analysis was

complemented with the evaluation of insertions and deletions in the APC, MLH1, MSH2 and PMS2 genes.

**Results/Outcome(s):** Duodenal adenomatosis stage 0-II was detected in 49 patients, 79% (21 male/28 female) at a mean age of 35.7 years, while advanced duodenal polyposis (Spigelman III or IV) was present in 13, 21% (9 male/4 female) at a mean age of 37.6 years. There was statistically significant association between family history and groups according to Spigelman ( $p = 0.03$ ), showing that patients with positive family history of FAP present 6.67 lower risk for advanced duodenal polyposis according to logistic regression analysis. 7 unrelated patients (6 male/1 female) presented ampullary adenomas at a mean age of 36.1 years (1 classified as major adenoma and 6 minor ampullary adenomas). Association between ampullary adenomas and extraintestinal manifestations was statistically significant in multivariate analysis ( $p = 0.009$ ). Within the total group, 28 patients belong to 12 different families. There was a similar Spigelman score among different first degree relatives from each family (Table 1). Balloon assisted enteroscopy was performed in 12 patients. Of those, 10 patients presented small tubular adenomas with low-grade dysplasia located in proximal jejunum.

**Conclusions/Discussion:** Advanced duodenal polyposis phenotype is predictable upon disease severity of a first degree-relative. Deletions in APC exon 15 were common in patients with advanced duodenal and/or ampullary disease. There was an association between presence of ampullary adenomas and extraintestinal manifestations.

**P298 Table 1. Familial distribution of Spigelman score among relatives from different families.**

Family	Number of relatives studied	Spigelman score of family members	Degree of relative consanguinity
1	2	IV, IV	1°
2	2	IV, IV	1°
3	3	II, II, 0	1°
4	3	I, 0, 0	1°
5	2	0, 0	1°
6	2	II, 0	1°
7	2	II, II	2°
8	2	0, 0	1°
9	4	II, II, I, 0	1°
10	2	III, II	1°
11	2	III, II	1°
12	2	0, 0	1°

**PREOPERATIVE STENTING DOES NOT PROVIDE AN ADVANTAGE OVER IMMEDIATE RESECTION FOR SEMI-OBSTRUCTIVE COLORECTAL CANCER.**

P299

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**Purpose/Background:** Expandable stent insertion for nearly obstructive colorectal cancer has been suggested to improve the outcomes by facilitating an elective resection.

This study aims to evaluate the impact of preoperative stent placement on clinical and quality parameters in patients with nearly-obstructive colorectal cancer.

**Methods/Interventions:** Curative resections of nearly-obstructive colorectal tumors, from 2009 to 2013 at King Khalid University Hospital, Riyadh, Saudi Arabia, were retrospectively reviewed. Patients who received colorectal metallic stent followed by a definitive resection after 2 weeks were compared to others for demographics, pre-existing co-morbidities, neoadjuvant therapy and tumor characteristics such as, pathological stage, mucin production and lymphovascular invasion. Type of surgery

**P299 Patients characteristics stratified by management pathway (immediate surgery vs. preoperative stenting)**

Variable	Immediate surgery (n= 41)	Preoperative stenting (n= 24)	p-value
Age, mean (SD)	55.5 (13.5)	59.5 (11.3)	0.2
Gender			
Male	14 (34.1%)	14 (58.3%)	0.06
Female	27 (65.9%)	10 (41.7%)	
Cardiovascular co-morbidity	6 (14.6%)	4 (16.7%)	0.8
Cerebrovascular co-morbidity	2 (4.9%)	2 (8.3%)	0.6
Renal disease	1 (2.4%)	3 (12.5%)	0.1
Diabetes	13 (31.7%)	9 (37.5%)	0.6
Hypertension	17 (41.5%)	8 (33.3%)	0.5
Recent neoadjuvant therapy	1 (2.4%)	2 (8.3%)	0.3
Pathological stage			
I	2 (4.9%)	0 (0%)	0.2
II	18 (43.9%)	9 (37.5%)	
III	18 (43.9%)	9 (37.5%)	
IV	3 (7.3%)	6 (25%)	
Mucin production	2 (4.9%)	2 (8.3%)	0.6
Type of surgery			
Colectomy	22 (53.7%)	13 (54.2%)	0.8
Proctectomy	16 (39%)	8 (33.3%)	
Subtotal/total colectomy or proctocolectomy	3 (7.3%)	3 (12.5%)	
Surgical approach			
Open	32 (78%)	13 (54.2%)	0.04
Laparoscopy	9 (22%)	11 (45.8%)	
Operative duration (minutes), mean (SD)	213.6 (104)	240.5 (85.2)	0.6
Total lymph node retrieval, mean (SD)	20.2 (8.1)	19.6 (8.8)	0.8
Positive nodes, mean (SD)	2 (2.8)	1.3 (2.3)	0.3
Lymph node ratio, mean (SD)	0.10 (0.14)	0.08 (0.14)	0.5
Preoperative hospital stay, median (IQR)	1 (1)	5.5 (6.8)	<0.0001
Postoperative hospital stay, median (IQR)	6 (2.5)	6 (4)	0.3
Total hospital stay, median (IQR)	7 (3)	13 (8.5)	<0.0001
Surgical site infection	2 (4.9%)	4 (16.7%)	0.1
Postoperative ileus	4 (9.8%)	0 (0)	0.1
Urinary tract infection	4 (9.8%)	1 (4.2%)	0.4
Pneumonia	1 (2.4%)	1 (4.2%)	0.7
ICU admission	1 (2.4%)	2 (8.3%)	0.3

Data illustrated by frequency (n) and percentage (%), unless mentioned otherwise.

(colectomy vs. proctectomy vs. subtotal / total resection), operative approach and duration were also evaluated. The outcomes of interest were total lymph node retrieval and ratio, operative duration, postoperative complications as well as length of hospital stay.

**Results/Outcome(s):** Of 65 patients who had a resection of nearly-obstructive colorectal cancer, 24 (36.9%) were managed by a metallic stent initially, while 41 (63.1%) underwent immediate surgery. Stent-related complications were 20.8% (n=5 / 24). Demographics and preoperative risk factors including cardiovascular, cerebrovascular and renal diseases, as well as neoadjuvant treatment were equivalent between the groups. Cancer stage (p=0.2), mucin-producing tumor (p=0.6), and lymphovascular involvement (p=0.8) were also similar. While laparoscopic resection was more likely to be performed on stented tumors (45.8% vs. 22%, p=0.04), type of surgery (p=0.8) and operative duration (p=0.6) were comparable. Total lymph node retrieval (mean [SD]: 20.2 [8.1] vs. 19.6 [8.8], p=0.8) and lymph node ratio (mean [SD]: 0.10 [0.14] vs. 0.08 [0.14], p=0.5) were similar. The development of surgical site infection (p=0.1), postoperative ileus (p=0.1), urinary tract infection (p=0.4), pneumonia (p=0.7) and ICU admission (p=0.3) were statistically insignificant. However, preoperative (median [IQR]: 1 [1] vs. 5.5 [6.8], p=<0.0001) and total (median [IQR]: 7 [3] vs. 13 [8.5], p=<0.0001) hospital stay were significantly longer for stent group. There was no difference in postoperative recovery (p= 0.3).

**Conclusions/Discussion:** These data suggest that colorectal stent insertion, as a bridge to surgery, is associated with prolonged hospitalization, with no clinical advantage over immediate surgical intervention.

#### ROBOTIC COMPLETE MESOCOLIC EXCISION FOR RIGHT-SIDED COLON CANCER: A SERIES OF 22 PATIENTS.

P300

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**Purpose/Background:** Complete mesocolic excision (CME) has been found to improve oncological outcomes in patients with colon cancer and favorable outcomes of open CME have been replicated with a laparoscopic approach. The introduction of robotic systems has further revolutionized the laparoscopy in colorectal surgery. However, data on the role of robotic surgery in right CME is still limited. We report on a series of patients the feasibility of robotic CME in patients with right-sided colon cancer.

**Methods/Interventions:** A retrospective review of a prospectively maintained database of 22 consecutive patients undergoing robotic CME for right-sided colon adenocarcinoma between February 2015 and October

2016 was performed. All the operations were performed by a single surgical team using a medial-to-lateral approach. Data on demographics, tumor characteristics, perioperative and oncologic outcomes were analyzed.

**Results/Outcome(s):** There were 12 women and 10 men with a mean age of  $66 \pm 14$  years and a body mass index of  $27.6 \pm 6.0$  kg/m<sup>2</sup>. Of the 22 patients, 7 patients underwent modified craniocaudal approach. There was one intraoperative complication (superior mesenteric vein injury) and no conversions. The mean operative time and estimated blood loss were  $272 \pm 74$  min and  $57 \pm 46$  ml, respectively. All the resections were complete with clear surgical margins. The mean length of the surgical specimen and number of harvested lymph nodes were  $32.6 \pm 9.0$  cm and  $39 \pm 11$ , respectively. The mean time to first bowel movement was  $3.1 \pm 1.2$  and length of hospital stay was  $5.9 \pm 1.7$  days. Postoperative 30-day complications included nasocomial pneumonia in one patient, atelectasis in one and wound infection in the other (14%). At a mean follow-up time of  $9.4 \pm 5.9$  months, there were no recurrences or mortality.

**Conclusions/Discussion:** We consider robotic CME is a feasible and safe procedure with acceptable morbidity and provides adequate oncologic outcomes. The technical advantages of the robotic system, further visualization and a high-degree articulation of instruments are very useful for clarifying the embryological planes and ligating the main vascular pedicles along the superior mesenteric vessels, allowing for more precise dissection.

#### TUMOURS OF THE ISCHIORECTAL FOSSA: A SINGLE INSTITUTION EXPERIENCE.

P301

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**Purpose/Background:** Tumours of the ischiorectal fossa are rare. There is little published data on the optimal diagnostic and therapeutic management. We present the largest single series to date of primary ischiorectal tumours.

**Methods/Interventions:** A retrospective review of a prospective database was performed. Data collected included patient demographics, presenting symptoms, radiological imaging, indication for biopsy, operative details, length of stay, histopathology, morbidity, 30-day mortality, survival, and recurrence.

**Results/Outcome(s):** 24 patients (15 female; median age 52) were treated at Royal Prince Alfred Hospital between February 1995 and June 2016. 63% of patients were symptomatic at presentation, with a mass and pain being the most common symptoms. Computed tomography (CT) and/or magnetic resonance imaging (MRI) were used to image all patients. 54% of patients underwent pre-operative biopsy, of which 62% were diagnostic. Management was altered in 38% due to biopsy results. 50% underwent local

excision with the other 50% requiring radical pelvic excision. Two patients underwent pre-operative angioembolisation. The median operating time was 225 minutes with a median blood loss of 1400 mL. Morbidity occurred in 29% with only 1 (4%) of patient experiencing a major complication. The median hospital stay was 8 days. Histopathology demonstrated: 17 soft tissue tumours, 2 GIST, 1 neuroendocrine tumour, 1 Merkel cell carcinoma, 1 basaloid carcinoma, 1 epidermal cyst and 1 lipoma. There were 5 malignant soft tissue tumours: 2 chordomata, 2 spindle cell tumours and 1 leiomyosarcoma. Tumour size ranged from 2 to 19 cm. 96% of patients were alive with 79% recurrence free at a mean follow up of 37 months (range 1 - 137 months).

**Conclusions/Discussion:** Tumours of the ischioanal fossa constitute a heterogeneous group of benign and malignant pathologies. Their diagnosis and treatment can be a challenging due to their rarity and location. Biopsy can be useful and changes management in over a third of cases.

#### LAPAROSCOPY IN COMBINATION WITH TRANSPERINEAL EXTRALEVATOR ABDOMINOPERINEAL EXCISION FOR LOCALLY ADVANCED LOW RECTAL CANCER.

P302

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**Purpose/Background:** Position change during the perineal phase of extralevator abdominoperineal excision may extend operative time and increase complications. We have applied the transperineal TAMIS and transabdominal laparoscopic techniques to the ELAPE procedure without a position change since 2013, and refer to the modification as transperineal ELAPE (TP-ELAPE). This study is to evaluate laparoscopy in combination with transperineal extralevator abdominoperineal excision for locally advanced low rectal cancer.

**Methods/Interventions:** Between May 2013 and February 2016, a total of 14 patients with locally advanced low rectal cancer underwent transperineal extralevator abdominoperineal excision for the perineal phase of extralevator abdominoperineal excision. The main outcome measures comprised circumferential resection margin involvement, intra-operative perforation, post-operative complications, and local recurrence.

**Results/Outcome(s):** There were 10 males and 4 females (age range, 46–72 years; median age, 59 years). The median distance from the anal verge was 3.3 cm (range, 2–4 cm). Pre- and post-operative parameters, such as clinical information, complications, and prognosis, were recorded. All patients underwent the transperineal procedure successfully. The median total operating time was 210 min (range, 180–280 min) with a perineal operating time

of 100 min (range, 80–150 min). The median intra-operative blood loss was 100 ml (range, 50–200 ml). Positive circumferential resection margins and intra-operative perforations were not observed. The post-operative hospital stay was 12 d (range, 9–18 d). The most common complications included chronic perineal pain (14.3%), sexual dysfunction (22.2%), urinary retention (21.4%), and perineal wound infection (7.1%). There were no local recurrences and metastases at a median follow-up of 25.5 months (range, 6–40 months).

#### P302 Clinical characteristics and postoperative complications of TP-ELAPE patients

Characteristics	n = 56
Age (y), median (range)	59 (46–72)
Male/female	10/4
BMI (kg/m <sup>2</sup> ), median (range)	27.4 (24.8–36.8)
Distance from anal verge (cm), median (range)	3.3 (2.0–4.0)
Pathologic tumor (T) category	
T0 (%)	1 (7.1)
T1 (%)	2 (14.3)
T2 (%)	7 (50.0)
T3 (%)	4 (28.6)
Pathologic node (N) category	
N0 (%)	6 (42.9)
N1 (%)	5 (35.7)
N2 (%)	3 (21.4)
Total operative time (min), median (range)	210 (180–280)
Transperineal operative time (min), median (range)	100 (80–150)
Intra-operative blood loss (ml), median (range)	100 (50–200)
Post-operative hospital stay (d), median (range)	12 (9–18)
Post-operative follow-up (mo), median (range)	25.5 (6–40)
Chronic perineal pain (12 months postoperative)	2
Sexual dysfunction	2/9
Urinary retention	3
Perineal wound complications	1
Infection	1
Seroma	0
Hernia	0
Wound dehiscence	0
Chronic sinus	0
Urinary system infection	1
Post-operative ileus	2

TP-ELAPE, transperineal extralevator abdominoperineal excision; BMI, body mass index

**Conclusions/Discussion:** Transperineal extralevator abdominoperineal excision for the perineal phase of extralevator abdominoperineal excision has the potential to simplify the surgical procedure, yet ensure a radical and safe operation.

### SMART IN THE PREVENTION OF PARASTOMAL HERNIA: A SINGLE CENTRE EXPERIENCE.

P303

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**Purpose/Background:** Parastomal hernia remains a frequent complication following creation of an abdominal stoma. Previous interests have focussed around the exploration of methods to repair however prophylactic mesh placement has demonstrated its efficacy in reduction of parastomal hernia. The aim of this retrospective analysis was to evaluate the outcomes of Stapled Mesh stomA Reinforcement Technique (SMART) in terms of parastomal hernia occurrence rate and mesh-related complications.

**Methods/Interventions:** All patients operated with an abdominal perineal resection or Hartmann's procedure with SMART from November 2013 to March 2016 were included. Patient demographics, operative details and stoma-related symptoms were collected. Patients were examined clinically by the medical team and also reviewed independently by a specialist stoma care nurse for signs of stoma-related complications. As part of oncological follow-up, CT scans were available for review for evidence of parastomal herniation.

**Results/Outcome(s):** 14 patients (mean age 76 years) were included in the analysis. All the SMART cases were successfully completed with no intraoperative or immediate post-operative complications. No cases of mesh-related complications such as infection, immediate stomal prolapse, stenosis, retraction, stomal obstruction, mesh erosion or fistulation were observed. No mesh removal was required. There were two cases of parastomal hernia detected on CT scan. Both cases have remained asymptomatic no intervention was required at this stage. Median follow-up was 30 months.

**Conclusions/Discussion:** Our medium term experience has demonstrated the efficacy of SMART in the reduction of parastomal hernia occurrence. With appropriate learning curve, parastomal hernia can be prevented.

### SOCIOECONOMIC AND GENDER DISPARITIES IN ANAL CANCER DIAGNOSIS AND TREATMENT.

P304

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**Purpose/Background:** We investigated whether receipt of radiation in patients with anal carcinoma is related to income level and other demographic factors.

**Methods/Interventions:** The SEER database (1988-2011) was queried and linked to the Area Health Resources File (AHRF). We used logistic regression and Kaplan-Meier analyses to correlate receipt of radiation and overall and cancer-specific survival with tumor stage, age, gender, and income.

**Results/Outcome(s):** Of 28,028 patients with anal cancer, 14,783 (53%) received radiation. Patients in the lowest quartile for median household income were significantly more likely to present at higher stages, were 1.87 times more likely to receive radiation (95% CI 1.74-2.00,  $p < 0.001$ ), and 1.27 times more likely to die of anal cancer (95% CI 1.18-1.33,  $p < 0.001$ ) than those in the highest income quartile. Additionally, we found that women presented at higher stages ( $p < 0.001$ ), were 2.67 times more likely to receive radiation (95% CI 2.55-2.81,  $p < 0.001$ ), and were 1.25 times more likely to die of anal cancer than men (95% CI 1.17-1.32,  $p < 0.001$ ).

**Conclusions/Discussion:** Socioeconomic and gender disparities exist in the detection, treatment, and outcomes of anal cancer in the U.S. Patients with lower median household income presented with more advanced stages of anal cancer, more commonly received radiation therapy, and were more likely to die of anal cancer than those in the highest median household incomes. Women were also more likely to present with more advanced stages of anal cancer, more likely to receive radiation therapy, and more likely to die of anal cancer than men. This demonstrates a need for increased healthcare access and screening for women and poorer populations.

Figure 1: Overall and Cancer-specific survival by Median Household Income quartile

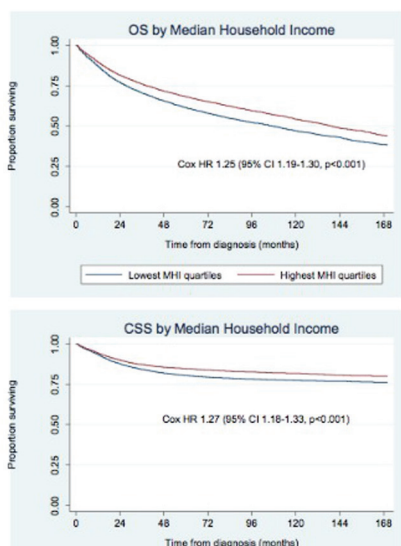


Figure 1: Overall and Cancer-specific Survival by Median Household Income Quartile

## RESECTION OF PRIMARY COLORECTAL CANCER PLUS CHEMOTHERAPY VERSUS CHEMOTHERAPY ALONE FOR UNRESECTABLE STAGE IV COLORECTAL CANCER.

P305

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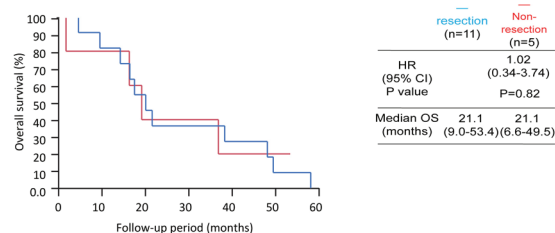
**Purpose/Background:** Chemotherapy is the standard of care for incurable stage IV colorectal cancer. Observational studies have suggested that patients with stage IV colorectal cancer who undergo resection of the primary cancer have better survival. Whether the addition of resection of the primary colorectal cancer to chemotherapy improves survival for these patients remains controversial. Furthermore, recent studies have suggested that right- and left-sided primary colon cancers have a distinct biology and prognosis. We aimed to investigate the superiority of resection of primary colorectal cancer followed by chemotherapy versus chemotherapy alone, with respect to overall survival in two groups: right- and left-sided primary stage IV colorectal cancer patients.

**Methods/Interventions:** The subjects were 69 patients who received chemotherapy for incurable stage IV colorectal cancer from 2010 to 2012. Sixteen patients had right-sided cancers and 53 had left-sided cancers. In the right-sided group, 11 (68.8%) had resection of the primary cancer. In the left-sided group, 33 (62.3%) had resection of the primary cancer. Chemotherapy included mFOLFOX6, FOLFIRI, XELOX, bevacizumab, cetuximab, panitumumab, and other agents. The primary endpoint was overall survival.

**Results/Outcome(s):** Median overall survival was 21.1 months (6.6-49.5) for right-sided patients assigned to chemotherapy alone, and 21.1 months (9.0-53.4) for those assigned to resection of primary colon cancer plus chemotherapy (hazard ratio 1.02, 95% CI 0.34-3.74; one-sided  $p=0.82$ ). Median overall survival was 9.2 months (1.7-42.7) for left-sided patients assigned to chemotherapy alone, and 28.6 months (3.9-64.5) for those assigned to resection of primary colon cancer plus chemotherapy (hazard ratio 2.33, 95% CI 0.19-4.46; one-sided  $p<0.05$ ).

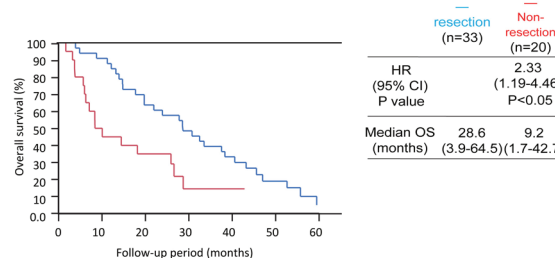
**Conclusions/Discussion:** Since resection of primary colon cancer followed by chemotherapy did not show any survival benefit compared with chemotherapy alone in incurable stage IV right-sided colorectal cancer, resection of primary colon cancer cannot be justified for treatment of such patients. However, resection of primary colon cancer followed by chemotherapy showed survival benefit in incurable stage IV left-sided colorectal cancer. Resection of primary colon cancer may be justified for treatment of patients with left-sided colorectal cancers.

Overall Survival in right-sided StageIV colon cancers



Median month of follow-up period : 21.6 (6.6-53)

Overall Survival in left-sided StageIV colon cancers



Median month of follow-up period : 21.9 (1.7-64.5)

### THE IMPACT OF SPLENIC FLEXURE MOBILIZATION ON LEFT-SIDED COLORECTAL RESECTION.

P306

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**Purpose/Background:** Splenic flexure mobilization is thought to minimize anastomotic tension and enhance perfusion at the anastomotic site. This study aimed to evaluate for any operative or postoperative advantage to such a technique for left-sided colorectal resection.

**Methods/Interventions:** Patients who underwent elective left colon or rectal resection with primary anastomosis and without fecal diversion from 2011-2016, were identified from a prospectively maintained outcomes database. Splenic flexure 'mobilized' and 'preserved' groups were compared for demographics, co-morbidity, diagnosis, type of surgery, approach, operative time, blood loss, specimen length, lymph node retrieval, intraoperative and thirty-day postoperative complications.

**Results/Outcome(s):** Of 296 elective left-sided colorectal resections meeting inclusion criteria, 219 (74%) patients underwent splenic flexure mobilization. Patient demographics and most co-morbidities including cardiovascular, pulmonary, neurological and disseminated cancer were comparable. Splenic flexure 'preserved' patients were more likely to have diabetes, and undergo proctosigmoidectomy, proctectomy and open surgery while 'mobilized' patients more likely underwent left colectomy and minimally invasive surgery. ASA score, wound class, operative duration, blood loss, transfusion and conversion were comparable. Although specimen was longer after splenic flexure mobilization (median [IQR]: 24 [10.5] vs. 18.7 [8.8],  $p < 0.0001$ ), total lymph node retrieval (median [SD]: 20 [13] vs. 21 [14.8],  $p = 0.9$ ) and lymph node ratio (mean [SD]: 0.3 [1.8] vs. 0.1 [0.2],  $p = 0.5$ ) were equivalent. Iatrogenic intraoperative complications were higher for splenic flexure mobilization (7.8% vs. 3.9%,  $p = 0.2$ ). Thirty-day postoperative complications including anastomotic leak, abscess or sepsis, wound infections, ileus, transfusion, and reoperation were similar.

**Conclusions/Discussion:** For left-sided colorectal resections, routine splenic flexure mobilization may not improve short-term outcomes and may instead increase surgical risk. These data support the use of splenic flexure mobilization on an as-needed rather than a routine basis.

### SHORT-TERM OUTCOMES OF PELVIC EXENTERATION AFTER SURGICAL TREATMENT OF RECTAL MALIGNANCY.

P307

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**Purpose/Background:** Pelvic exenteration is indicated as curative treatment for an advanced pelvic malignancy deemed resectable with adequate margins. Even though there is a well-described clinical benefit, data about short-term outcomes in a large cohort and frequency of non-colorectal procedures is lacking.

**Methods/Interventions:** The ACS-NSQIP database from 2005-2013 was queried to identify all patients who underwent a pelvic exenteration (CPT: 45126) for rectal malignancy (ICD-9:154.1). Descriptive statistics and a univariate analysis were executed using student T test and Chi2. A  $p$  value  $< 0.05$  was considered statistically significant with a confidence interval of 95%.

**Results/Outcome(s):** One hundred and twelve patients were identified; the mean age was  $56.6 \pm 11.5$  years, and 55.4% were women. Comorbidities included hypertension 34.8%, smoking 30.4%, disseminated cancer 29.5%, diabetes mellitus in 7.2%, alcohol abuse 4.5%, and chronic steroids 1.8%. Pre-operative chemotherapy and radiotherapy were administered in 8% and 45.5%, respectively. Postoperative morbidity included wound complications in 30.4% (superficial wound infections 16.1%, deep organ infections 10.7%, and dehiscence 3.6%), sepsis 8.9%, urinary tract infection 8.9%, pneumonia 3.6%, deep venous thrombosis 5.4%, and renal failure 0.9%. A reoperation was performed in 10.7%, transfusion 9.8%, vasopressor requirement 5.4%, and re-intubation 1.8%. Mean operative time was  $466.5 \pm 162.7$  minutes with a mean total length of stay of  $13.2 \pm 9.4$  days. There was an observed 30-day mortality of 0.9%. A partial cystectomy was performed in 0.9%, radical cystectomy 5.3%, ureterotomy 2.7%, hysterectomy 1.8%, and vaginectomy 3.6%. An omental flap and muscle flap was performed in 17.8% and 8.0%, respectively.

**Conclusions/Discussion:** Pelvic exenteration is well tolerated. The procedure is associated with a low mortality rate but a high reoperation rate and long hospital stays. We observed frequent wound complications as well as repeated need for non-colorectal procedures.



**P306 Patients' characteristics, intra and postoperative outcomes for mobilized and preserved splenic flexure**

Variable	SF Mobilized N= 219	SF Preserved N= 77	p-value
Age			
18 – 64	123 (56.2%)	44 (57.1%)	0.9
≥ 65	96 (43.8%)	33 (42.9%)	
Gender			
Male	101 (46.1%)	41 (53.2%)	0.3
Female	118 (53.9%)	36 (46.8%)	
Race (White)	141 (64.7%)	44 (57.1%)	0.1
Body mass index (BMI) kg/m2			
Under weight	4 (1.9%)	1 (1.3%)	0.6
Normal	67 (31.3%)	30 (39%)	
Overweight	74 (34.6%)	26 (33.8%)	
Obese	69 (32.2%)	20 (26%)	
Primary colorectal diagnosis			
Cancer	96 (43.8%)	55 (71.4%)	<0.0001
IBD	1 (0.5%)	2 (2.6%)	
Diverticular disease	105 (47.9%)	7 (9.1%)	
Other	17 (7.8%)	13 (16.9%)	
ASA score			
I	8 (3.7%)	1 (1.3%)	0.2
II	123 (56.2%)	34 (44.2%)	
III	77 (35.2%)	37 (48.1%)	
IV	4 (1.8%)	3 (3.9%)	
Unknown	7 (3.2%)	2 (2.6%)	
Type of surgery			
Left colectomy	128 (58.4%)	32 (41.6%)	0.03
Proctosigmoidectomy	81 (37%)	39 (50.6%)	
Other proctectomy	10 (4.6%)	6 (7.8%)	
Operative approach			
Open	18 (8.2%)	17 (22.1%)	0.001
Minimally invasive	201 (91.8%)	60 (77.9%)	
Specimen length,			
Median (IQR)	24 (10.5)	18.7 (8.8)	<0.0001
Mean (SD)	24.9 (9.2)	20.1 (9.3)	<0.0001
Total lymph node retrieval,			
Median (IQR)	20 (13)	21 (14.8)	0.9
Mean (SD)	22.5 (10.7)	24.3 (13.2)	0.4
Lymph node retrieval,			
≤ 12 lymph nodes	10 (11%)	6 (11.5%)	0.9
> 12 lymph nodes	81 (89%)	46 (88.5%)	
Lymph node ratio, mean (SD)	0.3 (1.8)	0.1 (0.2)	0.5
Iatrogenic intraoperative complication	17 (7.8%)	3 (3.9%)	0.2
Intraoperative splenic injury	4 (1.8%)	0 (0)	0.2
Intraoperative bladder injury	4 (1.8%)	1 (1.3%)	0.8
Redo anastomosis	5 (2.3%)	0 (0)	0.2
Intraoperative major bleeding	3 (1.4%)	0 (0)	0.3
Intraoperative enterotomy	3 (1.4%)	2 (2.6%)	0.5
Anastomotic leak	3 (1.4%)	2 (2.6%)	0.5
Abscess or sepsis	11 (5%)	6 (7.9%)	0.4
Surgical site infection (superficial, deep, organ space)	19 (8.7%)	6 (7.9%)	0.8
Wound disruption	5 (2.3%)	1 (1.3%)	0.6
Postoperative ileus	34 (15.5%)	13 (16.9%)	0.8
Transfusion	19 (8.7%)	7 (9.1%)	0.9
Reoperation	9 (4.1%)	3 (3.9%)	0.9
Length of stay, mean (SD), day	5.6 (5.8)	5.1 (3.4)	0.6

SF: Splenic flexure.

Data are presented as frequencies (n) and percentages (%), unless specified otherwise.

### TREATMENT STRATEGY FOR INTRA-PELVIC LOCAL RECURRENCE OF RECTAL CANCER.

P308

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**Purpose/Background:** Local recurrence rates have dramatically decreased after the introduction of total mesorectal excision (TME) and neoadjuvant chemoradiotherapy (nCRT) in rectal cancer surgery. However, once the intra-pelvic local recurrence occurs, its optimal treatment is still controversial in everyday practice.

**Methods/Interventions:** Retrospective chart review was performed with reference to patients' demographic parameters, pathologic features, and oncologic outcomes. Univariate and multivariate analyses were conducted to clarify the significant prognostic parameters.

**Results/Outcome(s):** Localized intra-pelvic local recurrence (LR) was diagnosed in 33 patients from 2000 to 2016 in our hospital. Patients with simultaneous distant metastases were excluded. Twenty-two patients were men, and 11 were women. Patients' age ranged from 38 to 84 years, with a mean of 67 years. Primary tumors were located in the recto-sigmoid in 8, the upper rectum in 9, and the lower rectum in 16 patients, respectively. Surgical treatment for LR was performed in 23 patients (70%). Adjuvant or palliative external beam radiotherapy (EBRT) was given in 17 patients (52%), intra-operative electron radiotherapy (IOERT) in 3 patients, and chemotherapy in 26 patients (79%), respectively. The number of fixation sites (F-number) was significantly correlated with the grade of resection margin status (R-number,  $p=0.02$ ). The median OS of the entire group was 38 months, with a 3 year-OS of 59.7%. In the entire group (33 pts), univariate analysis showed that the type of initial operation (Miles' operation vs. sphincter-preserving operation; 29 mo vs. 47 mo), primary tumor histology (mucinous vs. moderate vs. well; 18 mo vs. 38 mo vs. 47 mo), and the fixation site (axial/perineal vs. anterior/posterior/lateral; 49 mo vs. 36 mo) were significantly associated with post-LR median survival. However, F-number, surgical treatment (yes or no), R-number, and radiotherapy or chemotherapy (yes or no) were not associated with post-LR median survival. Multivariate analysis revealed that the type of initial operation and primary tumor histology were significantly and independently associated with post-LR median survival. While, in the resected group (23 pts), primary tumor histology and F-number were significantly and independently associated with post-LR median survival statistically.

**Conclusions/Discussion:** All these results suggested that patients' outcome was not determined by our treatment modalities, but by tumor characteristics exclusively. Our current strategy should be reconsidered, and new modality, such as carbon ion radiotherapy, should be introduced.

### USE OF EPIDURAL ANALGESIA IN SIGMOIDECTOMY: IS THERE ANY ADVANTAGE IN THE ERA OF MINIMALLY INVASIVE SURGERY?

P309

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**Purpose/Background:** Enhanced Recovery programs play an important role in the per-operative management after colorectal surgery. However, these programs were initially developed in the context of open surgery and are nowadays used in laparoscopic surgery without substantial alterations. One of their key elements is the use of epidural analgesia (EA). Nevertheless, there is no consensus in what regards the effects of EA on postoperative outcomes after laparoscopic surgery. The aim of this study is to evaluate the effects of EA on postoperative outcomes after elective laparoscopic sigmoidectomy (ELS).

**Methods/Interventions:** The use of EA was temporarily discontinued in ELS based on available literature. Data from patients undergoing ELS between January 2014 and December 2015 was then prospectively analyzed. Patients with EA were compared with patients with no EA (NEA) in analgesics administered postoperatively (AAP) between postoperative day 0 and 3, length of stay (LOS), day of first defecation (DFD), day of first mobilization (DFM), and postoperative complication rate (CR). AAP were paracetamol, morphine, tramadol, oxycodone and metamizole.

**Results/Outcome(s):** 123 patients were included, 77 in EA group and 46 in NEA group. The groups were statistically similar. Mean LOS, DFD and CR were not statistically different when comparing EA with NEA: LOS 6.5 vs. 5.1 ( $p>0.05$ ), DFD 1.5 vs. 1.8 ( $p>0.05$ ), CR 19 vs. 5 ( $p>0.05$ ). DFM was significantly shorter in the NEA group (1.4 days) when compared with EA group (1.6) ( $p<0.05$ ). Mean amount of AAP in mg was not statistically different (EA vs. NEA): paracetamol 4943.5 vs. 2682.5 ( $p>0.05$ ), tramadol 4691 vs. 2935 ( $p>0.05$ ), oxycodone 4704.5 vs. 2921.5 ( $p>0.05$ ), morphine 4145 vs. 2876 ( $p>0.05$ ); except for metamizole 3112.5 vs. 3908.5 ( $p=0.04$ ).

**Conclusions/Discussion:** EA does not offer benefits on postoperative analgesia or outcomes after elective laparoscopic sigmoidectomy. Therefore, we have discontinued per-protocol use of EA in ELS.

## PLASMA MICRORNA 21: DIAGNOSTIC BIOMARKER AND PREDICTS POSITIVE AND NEGATIVE LYMPH NODES IN COLORECTAL CANCER.

P310

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**Purpose/Background:** Colorectal cancer is the third commonest cancer with nearly 1.4 million new cases identified throughout the world in 2012 with survival rate of 70% with lymph node spread. There is a pressing need for new non-invasive blood based test to improve early detection and monitoring of CRC. MiRNAs are small non-coding RNAs involved in fundamental cell processes such as development, differentiation, proliferation, survival and death. Studies have identified miRNAs in plasma of cancer patients in a stable form. The study aims to evaluate whether miR 21 abilities as diagnostic and prognostic Biomarker.

**Methods/Interventions:** 44 patients with Colorectal Cancer were selected from our institution's colorectal cancer surveillance programme. All selected patients at follow-up had no evidence of tumour recurrence on clinical, radiological and endoscopic assessment. Blood samples were obtained pre-treatment and at a median follow-up of 36 months. A total of 32 pairs of blood samples were matched pre and post treatment. Plasma RNA was extracted and target miRNAs were identified on pooled case miRNA assay cards. The miRNA fraction was quantified by quantitative RT-PCR assay. The results of pre and post-treatment samples were analysed using Microsoft excel 2010 & SPSS Software v22.0. Relative expression (DCT) for each miRNA was created by normalizing the expression levels (CT) with that of RNU6B.  $DCT\ miR21\ pre-treatment = miR21\ Pre-treatment - U6\ Pre-treatment$   
 $DCT\ miR21\ post-treatment = miR21\ Post\ Treatment - U6\ Post-treatment$   
 $DDCT\ miR\ 21 = DCT\ miR21\ pre-treatment - DCT\ miR21\ post-treatment$  All the analysis was performed on SPSS Software v22.0 (IBM, New York, USA) and Microsoft word 2010. \*D= Delta

**Results/Outcome(s):** Paired T-Test of miR 21 levels of 32 matched sample pairs showed significant difference between Pre-Treatment (M = 36.8822, SD = 4.77472) and Post-Treatment (M=32.6625, SD = 4.91903);  $t = 3.855$ ,  $p=0.001$ ". The levels were low before treatment and high after treatment. **Mann-Whitney** test and **Kruskall- Wallis** test were done to evaluate the relationship between miR-21 Pre- Rx, miR 21 Post Rx, miR-21 Pre-Post Rx, DCT miR21 Pre- Rx, DCT Post miR21 - Rx and DDCT Pre-Post miR21 against the TNM,Dukes,Cea levels, Differentiation, Site of tumour, Sex, Median Age, Metastasis, Treatment and Margin resection. The results were not significant except for Node staging, Site of tumour and Age (Image 1).

**Conclusions/Discussion:** The Mean miR 21 Levels increased from Pre-Treatment to Post-Treatment levels. Pre-treatment levels were Low in right sided colon tumours and higher in left sided colonic tumours. Post treatment expression levels were high in < 72.5 comparatively to > 72.5 median age. After normalising with U6, Pre-Treatment expression levels are high in Node Negative tumours and low in node positive tumours, High on NO and N2 and low for N1 lymph node stage.

Image 1: Statistical tests of miR 21 expression levels with variables Lymph node status, Median Age & Site of tumour

Test	Variables	miR21 Pre- Rx	miR21 Post - Rx	miR 21 Pre- Post Rx	DCT miR21 Pre- Rx	DCT Post Mir21 - Rx	DDCT Pre- Post Mir21
(N) Node	Node +ve vs -ve						
	Mann Whitney D= No Nodes 1= up to 3 nodes 2= >4 nodes	p= 0.338	p= 0.866	p= 0.283	p=0.027	p=0.837	p=0.025
Age	Median Age < 72.5=1 2= Age > 72.5						
	Mann Whitney	p=0.086	p=0.043	p= 0.642	p=0.867	p=0.128	p=0.287
Site of tumour	1=Right Colon 2=Left Colon 3= Rectum						
	Kruskall Wallis	p= 0.013	p= 0.210	p= 0.392	p= 0.276	p= 0.442	p= 0.499

## TUMOR LOCATION AND PATHOLOGIC COMPLETE RESPONSE FOLLOWING NEOADJUVANT TREATMENT FOR LOCALLY ADVANCED RECTAL ADENOCARCINOMA: DOES LOCATION MATTER?

P311

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Wyndmoor, PA; Philadelphia, PA; Bethlehem, PA

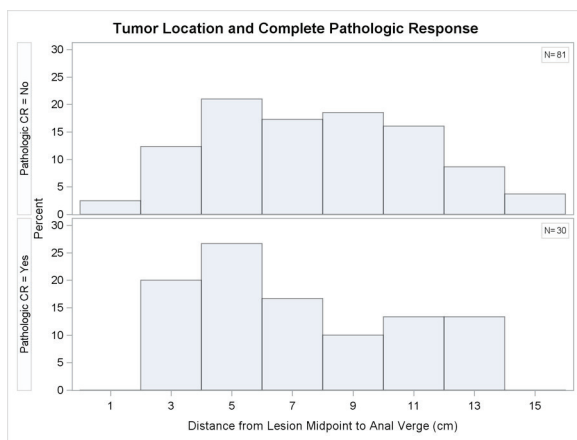
**Purpose/Background:** Despite advances in the treatment of rectal adenocarcinoma, the management of locally advanced disease remains a challenge. The standard of care for patients with Stages II and III rectal cancer includes neoadjuvant chemoradiation followed by total mesorectal excision and post-operative chemotherapy. Much effort has been dedicated to the identification of predictive factors associated with pathologic complete response (pCR). Although previously there had been no evidence that anatomic tumor location within the rectum affects pathologic response, recent data suggest that tumors positioned at the mid-rectum are more likely to undergo pCR. The aim of our study was to examine our institutional experience and determine whether any association exists between anatomic tumor location and the rate of pCR.

**Methods/Interventions:** Using data from our prospectively maintained tumor registry, a query was completed for all patients with locally advanced rectal adenocarcinoma who underwent treatment at our institution from 2002-2015. Only those patients with AJCC Stage II or III disease who underwent pretreatment endoscopic evaluation at our facility, followed by neoadjuvant chemoradiation and subsequent total mesorectal excision were included. Demographics, pre-treatment, post-treatment, and final pathologic TNM staging data were collected

as well as treatment intervals in days, recurrence status, overall survival, and disease-free survival. Patients with incomplete endoscopic data, staging information, survival, or recurrence status were excluded. The primary outcome measured was the degree of pathologic response. Logistic regression was used to adjust for covariates.

**Results/Outcome(s):** Of the 135 patients eligible in the study cohort, 39% were female and 61% were male. Regarding initial clinical stage, 43% were Stage II and 57% were Stage III. A total of 29% had a pCR, 43% had partial pathologic response, and 28% had no response from neoadjuvant treatment. Tumor location ranged from 0-13cm from the anal verge. Longitudinal tumor length was recorded in 111 patients, facilitating the calculation of mean tumor distance from the anal verge. This ranged from 0-15.5cm. Univariate and multivariate analyses were completed using pCR as a primary outcome. No statistically significant difference was noted based on tumor location, regardless of measurement approach. A trend was observed between tumors above 6.5cm from the anal verge and decreased pCR which was of borderline statistical significance after adjusting for covariates ( $p=0.07$ ).

**Conclusions/Discussion:** Anatomic location of tumor within the rectum does not affect complete pathologic response following neoadjuvant therapy and subsequent surgical resection. The anatomic distribution of rectal tumors is uniform and is not predictive of tumor response to treatment.



Comparison of tumor location and degree of pathologic response using distance from the lesion midpoint to the anal verge.

## SURVIVAL AND PERIOPERATIVE OUTCOMES AMONG PATIENTS WITH RECTAL CANCER: THE ROLE OF PRIOR PROSTATE CANCER AND RADIOTHERAPY.

P312

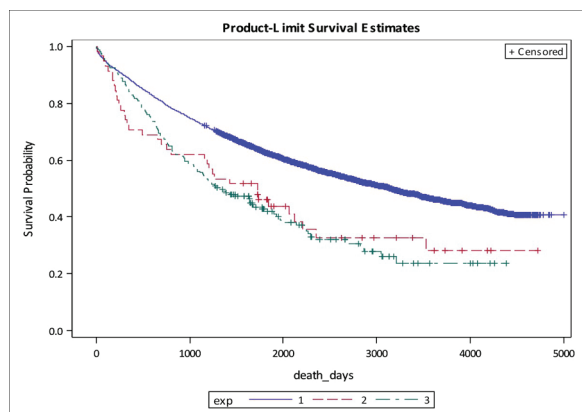
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**Purpose/Background:** Patients with rectal cancer and a prior history of prostate cancer pose a unique clinical challenge. Often, radiation, in the form of brachytherapy or external beam radiation, is part of the prostate cancer treatment. Previous pelvic irradiation may make treatment for rectal cancer more complicated. It is unknown whether rectal cancer patients with a history radiation therapy for prostate cancer have worse outcomes than those patients who have not been previously treated with radiation for prostate cancer. The objective of this study is to investigate the impact of previous radiation for prostate cancer (PCa) on survival, extent of surgical resection, and rate of permanent stoma for patients with rectal cancer (RCa).

**Methods/Interventions:** We conducted a population-based, retrospective cohort study of men who underwent surgical treatment of RCa from 2002-2010. Patients were classified into three cohorts: (1) no prior history of PCa, (2) prior history of PCa treated without radiotherapy, and (3) prior history of PCa treated with radiotherapy. The primary outcome was overall survival. Secondary outcomes included rectal cancer surgical approach, ICU admission, length of stay, ER visits, and delayed formation of a new stoma.

**Results/Outcome(s):** Among 7096 men who underwent surgery for RCa, 6867 patients had no prior history of PCa, 58 had a history of PCa treated without radiotherapy, and 171 had a history of PCa treated with radiotherapy. The five-year overall survival was 62% (95% CI 61-64%) for patients without a prior history of PCa, 46% (95% CI 25-65%) for patients with a history of PCa treated without radiotherapy, and 42% (95% CI 29-54%) for patients with a history of PCa treated with radiotherapy ( $p<0.0001$ ). In multivariable analysis, patients with a history of PCa treated with radiotherapy were at increased risk of death (aHR 1.30, 95% CI 1.07-1.58) compared to those without a history of PCa. Furthermore, patients with a history of PCa treated with radiotherapy had a significantly increased risk of resection with permanent stoma.

**Conclusions/Discussion:** A previous history of radiotherapy for prostate cancer is a poor prognostic factor in rectal cancer patients with a 30% increased risk of death compared to patients without a prior history of prostate cancer. Additionally, patients with a history of radiotherapy for prostate cancer are likely to experience a more morbid surgical resection.



Kaplan Meier survival analysis, among patients without a history of prostate cancer (exposure 1), patients with prostate cancer treated without radiotherapy (exposure 2), and patients with prostate cancer treated with radiotherapy (exposure 3).

### HISTOLOGY VERSUS LOCATION: HOW SHOULD SQUAMOUS CELL CARCINOMA OF THE RECTUM BE STAGED?

P313

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**Purpose/Background:** Squamous cell carcinoma of the rectum (RSCC) is a rare malignancy for which the American Joint Committee on Cancer (AJCC) does not have a standardized staging system. As a result, to date, there is a controversy as to whether the T stage of this neoplasm should be based on depth of invasion, as in rectal adenocarcinoma, or on size, as in anal squamous cell carcinoma. We hypothesized that a staging system based on squamous histology rather than rectal location would be more accurate in predicting the prognosis of RSCC patients.

**Methods/Interventions:** The Surveillance, Epidemiology, and End Results (SEER) database was used to identify patents diagnosed with RSCCs between 1998 and 2013. Patient were staged according to the AJCC classification of rectal adenocarcinoma (AJCC-rectum, n=1646), and anal squamous cell carcinoma (AJCC-anus,

n=1327). Data were examined using simple summary statistics, chi-square and student's-T tests, Kaplan-Meier analysis, and Cox proportional hazards regression. Survival analyses were adjusted by gender, age, race, and management strategy (no surgery vs radical resection and no radiation vs external beam radiation therapy).

**Results/Outcome(s):** Majority of patients were white (85%) and female (65%). Mean age at diagnosis was  $62 \pm 14$  years. Stages 0 and IV were represented by the same subset of patients in both staging systems, and therefore had the same 5-year DSS (93% and 21%, respectively). Among patients staged according to AJCC-rectum, while a significant difference in 5-year DSS was observed for stage I as compared to higher stages, no difference was noted between stage II and III (80% vs 61% and 62%, respectively). However, in the AJCC-anus classification, a significant difference was observed across all stages DSS (87% vs 72% vs 59%,  $p < 0.001$ ). Patients with RSCCs confined to the submucosa (AJCC-rectum stage I) and  $> 2$ cm in size (AJCC-anus stage II) had worse 5-year DSS than patients with cancers confined to the submucosa and  $\leq 2$  cm in size (AJCC-anus stage I) on both univariate and multivariate analyses (78% vs 87%,  $p < 0.03$ ). Patients with T4N0 RSCCs (AJCC-rectum stage II; AJCC-anus stage III) were found to have lower 5-year DSS as compared to patients with any T with positive lymph nodes (stage III in both systems, 49% vs 62%,  $p < 0.02$ ). After adjustment for demographic variables and treatment modalities, the prognostic discrimination based on hazard ratios provided by the AJCC-anus was superior to that of AJCC-rectum (Table 1).

**Conclusions/Discussion:** Stage migration of submucosal RSCCs  $> 2$  cm and lymph node negative T4 to the next higher stage accounted for the better survival of patients in AJCC-anus stage I and stage II compared to patients staged by AJCC-rectum. Our data suggest that a staging system based on histology (AJCC-anus) rather than on location (AJCC-rectum) is more accurate in predicting the prognosis of patients with stage I, II, and III rectal squamous cell carcinomas.

#### P313 Multivariate analysis for survival of AJCC-rectum vs AJCC-anus based on stage

STAGE	AJCC-Rectum		AJCC-Anus	
	HR (95% CI)	p-value	HR (95% CI)	p-value
0	Reference		Reference	
I	3.9 (2.5 - 6.2)	<0.001	2.2 (1.1 - 4.5)	0.020
II	8.9 (5.6 - 14.4)	<0.001	5.8 (3.6 - 9.5)	<0.001
III	8.4 (5.2 - 13.7)	<0.001	9.6 (6.0 - 15.6)	<0.001
IV	30.3 (18.9 - 48.8)	<0.001	31.6 (19.5 - 51.2)	<0.001

The analyses were adjusted by gender, age, race, and treatment modalities.

HR indicates hazard ratio; CI, confidence interval.

## RESULTS OF COLORECTAL CANCER DIAGNOSTICS AND TREATMENT IN 2005 AND 2010 IN LITHUANIA: HAVE WE IMPROVED?

P314

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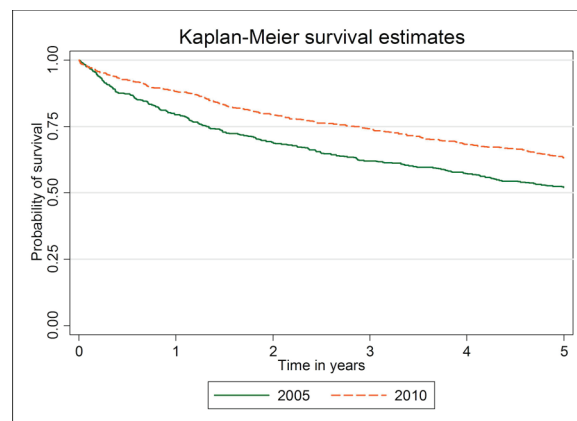
**Purpose/Background:** The goal of this study was to compare the results of colorectal cancer diagnostics and treatment in 2005 and in 2010 in Lithuania.

**Methods/Interventions:** A retrospective comparative study with 5 year patient follow-up was performed. The data of all the patients who were treated for CRC in 2005 and 2010 in the three main Lithuanian hospitals was compared. Demographic characteristics, distribution of the tumours, preoperative diagnostics and staging, preoperative treatment, surgical treatment, the quality of pathological examination, morbidity, mortality, the duration of hospital stay were analysed. Postoperative morbidity was measured according to the Clavien-Dindo classification. The pathology specimen was evaluated according to the TNM staging system, lymphovascular invasion, differentiation grade, completeness of resection (R). Involvement of circumferential resection margins was assessed for the rectal tumours. Survival data was received from the Lithuanian Cancer Registry. 1-year and 5-year overall survival data were compared between the groups. The statistical software IBM SPSS (v.21) was used for the statistical analysis. Continuous variables were checked for the normality of distribution by the Kolmogorov-Smirnov and Shapiro-Wilk tests and compared using the Student t test when the data were normally distributed or the Mann-Whitney test when the data were nonnormally distributed. The association between categorical variables was verified using the Pearson chi-square test. Survival was estimated by the Kaplan-Meier method. The difference between the survival curves was determined using the log-rank test. The level of significance was set at 0.05.

**Results/Outcome(s):** Colorectal cancer diagnostics and treatment improved from 2005 to 2010 significantly. The disease was identified as stage III-IV for 45 % vs. 48 % of the patients, however computed tomography staging scan was performed only for 5.9 % vs. 17.8 % in 2005 and 2010, respectively. Meanwhile, preoperative radiotherapy for T3-T4 advanced rectal tumours was initiated for 18.1 % vs. 45.1 % of the patients, laparoscopic operations were performed 1.5 % vs. 10.5 %, and abdominoperineal resections – 42.7 % vs. 27.8 % in 2005 and 2010, respectively. The number of harvested lymph nodes was mentioned in 55.8 % vs. 97.7 % of the cases, whereas more than 12 lymph nodes were examined in 18 % vs. 66.6 % of cases after histological examination. Postoperative complications occurred in 35.8 % vs. 21.1 % of the patients; and the hospital stay was 17.5 vs. 14.5 days. The overall 5 year

survival was 52.1 % vs. 63.1 % ( $p < 0.0001$ , Figure 1), while the 5 year survival of the patients with stage IV of disease was 4.2 % vs. 17.8 % in 2005 and 2010, respectively.

**Conclusions/Discussion:** Diagnostics and treatment of the patients with colorectal cancer has significantly improved in 2010 in comparison with 2005, resulting in improved long-term survival.



5 year survival curves of patients, treated for CRC in 2005 and 2010

## A COMPARISON OF TUMOUR CHARACTERISTICS AND ONCOLOGICAL OUTCOMES IN PATIENTS WITH SCREEN-DETECTED AND SYMPTOMATIC COLORECTAL POLYP CANCERS.

P315

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**Purpose/Background:** Around the world, population bowel screening programmes have been implemented in an attempt to reduce colorectal cancer mortality by detecting and treating disease at an early stage. It is estimated that 10% of all screen-detected cancers are polyp cancers, whereby the tumour is confined to a focus of malignancy within an excised colorectal polyp. Knowledge around the biology and natural history of these early asymptomatic polyp cancers is limited, however, and it is unclear whether they carry the same prognosis as corresponding symptomatic lesions. The aim of this study was to compare the clinico-pathological characteristics and oncological outcomes of screen-detected polyp cancers with those diagnosed via symptomatic pathways.

**Methods/Interventions:** This retrospective cohort study included all patients with a colorectal polyp cancer diagnosed at a tertiary referral centre in Scotland between April 2000 and December 2015. Patients were divided into those detected through the national bowel screening programme (SCREENED) and those diagnosed following referral for investigation of gastrointestinal symptoms (SYMPTOMATIC). Data was collected on patient

characteristics, endoscopic findings, polyp histology and long-term oncological outcomes (overall survival; cancer-specific survival; disease recurrence)

**Results/Outcome(s):** In total, 127 patients with colorectal polyp cancers were included (67 screened; 60 symptomatic). Screened polyp cancers were younger (median 65 years versus 71 years,  $p=0.028$ ) with a lower burden of co-morbidity (Charlson score  $<3$ ; 39% versus 67%,  $p=0.003$ ). In terms of location, screened polyp cancers were predominantly colonic while symptomatic polyp cancers were more likely to be located in the rectum (25% versus 8%,  $p=0.02$ ). Pathological evaluation also identified significantly lower levels of lymphovascular invasion in screened polyp cancers (8% versus 25%,  $p=0.007$ ). Overall survival was significantly longer in the screened cohort (167 versus 106 months,  $p=0.010$ , log rank test) with a trend towards improved cancer-specific (182 versus 122 months,  $p=0.058$ , log rank test) and recurrence-free survival (178 versus 119 months,  $p=0.082$ , log rank test)

**Conclusions/Discussion:** We have identified a number of important differences between the tumour biology and natural history of screen-detected and symptomatic colorectal polyp cancers. Although some of these observations may be partly explained by differences in the age and comorbidity profiles, other variations are harder to account for. In particular, lower levels of lymphovascular invasion in screened lesions may be representative of a less aggressive phenotype.

### COLORECTAL CANCER WITH LIVER METASTASES: OUTCOME IN INDIAN SUBCONTINENT.

P316

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**Purpose/Background:** Colorectal cancer (CRC) rank fourth most common malignancy in male population and third most common malignancy in female population in India. According to GLOBOCAN 2012, total death rate due to CRC was 28,000 and 21,000 in male and female population respectively. High death rate in Indian population reflects advanced stage at presentation. Purpose of this study is to see outcome of colorectal cancer with liver metastases in Indian population.

**Methods/Interventions:** We performed retrospective study of our database of patients, who underwent treatment for CRC at our centre from January 2013 to December 2014.

**Results/Outcome(s):** During above period, 763 patients presented with CRC at our centre, out of these 88 patients (11.5%) had metastases involving liver whereas 120 (15.7%) patients had metastases without liver involvement. Metastases were confined to liver only in 28 patients (uni-lobar in 4, bi-lobar in 24). In 83 (94.3%) patients liver metastases were synchronous whereas in 5 patients (5.7%),

liver metastases were metachronous. Surgical resection of primary was done in 18 patients. All patients with liver confined metastases were referred to liver clinic for assessment of resectability after 4 cycles of chemotherapy. In three patients surgical resection of liver metastases was done, where as non-surgical ablation (RFA/TACE) of liver metastases was done in 3 patients. 57 patients received chemotherapy only and 13 patients were candidate for supportive care only. Biological therapy was given to six patients (6.8%). Median follow duration was 6.0 months (range, 1.1 – 34.2 months). Median over-all survival (OS)

#### P316 Median survival in patients with colorectal cancer with liver metastases according to various variables.

Serial No.	Variable	Median over-all survival (Months)
1	Sex:	
	Male	11.6
	Female	13.0
2	Age Group:	17.3
	21-40	11.6
	41-60	10.8
	>60	
3	Subsite:	12.4
	Colon	14.4
	Rectum	
4	Histology:	14.3
	Signet ring	13.4
	Mucinous	13.0
	Overall	
5	CEA Level:	17.3
	<3	31.2
	3-10	10.6
	11-100	13.0
	101-1000	8.7
	>1000	
6	Performance status:	15.2
	ECOG 1	13.4
	ECOG 2	1.6
	ECOG 3	
7	Treatment Received	25.6
	Surgery of Primary	33.4
	Tt of both primary & metastasis	11.8
	Chemotherapy only	2.1
	Best supportive care	
8	Chemotherapy type:	13.2
	Oxalipaltin only	15.7
	Oxalipaltin and	2.1
	Irinotecan combined	
	No chemotherapy	

in patients with liver metastases was 13 months compared to 15.1 months in patients with non – liver metastases. Median OS according to various variables is summarised in the table 1 below. Out of 24 patients presenting with bi-lobar liver metastases, two patients finally underwent definitive treatment of liver metastases (one patient resection and other one RFA) leading to conversion rate of 9.1%. Mean OS in patients receiving non-surgical treatment for liver metastasis was 22.2 months compared with 27.6 months for patients undergoing surgery for liver metastasis.

**Conclusions/Discussion:** Surgical resection of liver metastases is less in Indian population due to heavy burden of disease, bi-lobar involvement and less conversion rate probably due to under-utilization of biological therapy. To improve the outcome better access to biological therapy and referral of such cases to tertiary care centre with multi-disciplinary care is required.

### COLORECTAL CANCER SCREENING IN AN URBAN HOSPITAL POPULATION.

P317

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**Purpose/Background:** Screening for colorectal cancer (CRC) has been demonstrated in randomized trials to reduce mortality. However, many patients do not get adequate screening and can present with advanced disease. The purpose of this study was to uncover barriers to screening by surveying an urban hospital inpatient population in hopes of devising a novel way to inform patients about its importance.

**Methods/Interventions:** The study was a cross-sectional survey on a single day at a single academic, urban, tertiary care hospital with 926 beds. A survey was created to capture patient demographics, personal and family history of CRC, concerning symptoms, personal history of benign colorectal disease, whether or not patients had been recommended for CRC screening and if so, what test was performed, if any. We also asked what types of barriers were present if a patient was not current with his or her screening. After approval by the hospital's IRB, the survey was administered to all inpatients ages 20-85 on one by 6 team members from the colorectal surgery department with the following exclusion criteria: vulnerable populations (prisoners, pregnant or postpartum women, psychiatry ward); and patients in the intensive care, cardiac, stepdown, and intermediate care units. Participation was voluntary. Responders were divided into two groups based on whether they were up to date with screening (Group A) or not (Group B) based on current NCCN guidelines, and the groups were compared. Categorical variables were assumed to be nonparametric and were compared using a two-tailed Fischer's Exact Test.

**Results/Outcome(s):** We surveyed 337 patients and had 197 voluntary responders for a participation rate of 58% (see Table 1). Average age was 67, with 51.4% males. Patients were excluded if they did not meet criteria for screening. Colonoscopy was the most common screening test (95%), and 64% of those surveyed were up to date on screening. The most common reasons for not being screened were the following: the test was not recommended by anyone (68%, 34/50), there was not enough time (10%, 5/50), patient did not feel the test was necessary (6%, 3/50), and concern for risks of the test (6%, 3/50). A significant difference was found between the groups for married individuals (A, 51% vs B, 25%;  $p < 0.05$ ). Patients in group B tended more often to be single (20% vs 32%) or widowed (17% vs 27%), though results were not statistically significant.

**Conclusions/Discussion:** To our knowledge, this is the first study surveying inpatients at a single institution regarding adherence and barriers to CRC screening. Overall rates of screening in our study approximate the national average. We also found that personal support, perhaps from a spouse, may contribute to better adherence to CRC screening guidelines. The inpatient setting presents a unique opportunity to study barriers to CRC screening as well as improve patient education and further increase the adherence rate for CRC screening.

**Table 1- Demographics**

	Total	Screened	Not Screened	p value
<b>Responders (%)</b>	175 (100%)	112 (67.8%)	63 (36%)	
<b>Mean Age</b>	67.8	67.8	66.2	0.4065
<b>Men</b>	90 (51.4)	58 (51.8)	32 (59.8)	0.7594
<b>Marital Status</b>				
Single	42 (24.0)	22 (19.6)	20 (31.8)	0.0964
Married	73 (41.7)	57 (50.9)	16 (25.4)	0.0013
Widowed	36 (20.6)	19 (17.0)	17 (27.0)	0.1236
Divorced	19 (10.9)	11 (9.8)	8 (12.7)	0.6159
Separated	5 (2.9)	3 (2.7)	2 (3.2)	1
<b>Ethnicity</b>				
White	34 (19.4)	23 (20.5)	11 (17.5)	0.6936
Hispanic	5 (2.9)	3 (2.7)	2 (3.2)	1
Black	129 (73.7)	81 (72.3)	48 (76.2)	0.1815
Native American	1 (0.6)	1 (0.9)	0 (0)	1
Asian	5 (2.9)	3 (2.7)	2 (3.2)	1
Other	1 (0.6)	1 (0.9)	0 (0)	1
<b>Education</b>				
No education	0 (0)	0 (0)	0 (0)	1
Nursery to 8th	6 (3.4)	3 (2.7)	3 (4.8)	0.6684
Some high school	21 (12.0)	10 (8.9)	11 (17.5)	0.1441
HS diploma	61 (34.9)	41 (36.6)	20 (31.8)	0.6204
Some college	32 (18.3)	21 (18.8)	12 (19.0)	1
Trade	7 (4.0)	6 (5.4)	1 (1.6)	0.4241
Associate's degree	4 (2.3)	4 (3.6)	0 (0)	0.2981
Bachelor's	19 (10.9)	10 (8.9)	9 (14.3)	0.3151
Master's	12 (6.9)	10 (8.9)	2 (3.2)	0.2156
Professional	3 (1.7)	3 (2.7)	0 (0)	0.554
Doctorate	3 (1.7)	2 (1.8)	1 (1.6)	1
<b>History</b>				
Benign CR disease	31 (17.7)	22 (19.6)	9 (14.3)	0.4162
Symptoms of CRC	47 (26.9)	28 (25.0)	19 (30.2)	0.4812
FH of CRC or polyps	35 (20.0)	25 (22.3)	10 (15.9)	0.3327



### MISMATCH REPAIR PROTEIN EXPRESSION (MMR) IN COLORECTAL CANCER: A CLINICOPATHOLOGICAL CORRELATION.

P318

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**Purpose/Background:** To study the MMR Protein expression and its Clinicopathological correlation in colorectal cancer patients in north India.

**Methods/Interventions:** A prospective study was conducted on histologically proven patients of adenocarcinoma of colorectum in a tertiary care hospital in north India between May 2014- June 2016. MMR Protein loss was determined by using Immunohistochemistry for MLH1, MSH2, PMS2 and MSH6. SPSS version 16.0 (IBM corporation, Armonk, NY, USA) was used for statistical analysis. Continuous data were used as mean or median and discrete data were reported as number (percentage)

**Results/Outcome(s):** 52 patients (38 males and 14 females) underwent resection for colorectal cancer with the median age of 52. year (16-81 years). 35% of the patients (n=18) were younger than 50 years of the age. 3 patients had associated history of malignancy in the family. 29 (56%) patients had right colon cancer, 9 (17%) left colon cancer and 14 (27%) rectal cancer. 2 patients each had synchronous and metachronous cancer. Histology revealed well defferentiated tumor in 16, moderately differentiated in 10 and poorly diffentiated tumor in 26 patients. MMR protein loss was seen in 15(29%) patients. Seven (46%)of these patients were less than 50 years of age. Combined loss of MSH2 and MSH6 was seen most commonly and it was found in 6 patients. 12(80%) patients with MMR protein loss had tumor located proximal to the splenic flexure compared to 3(20%) located distal to the splenic flexure. There was no difference in MMR protein loss based on patients age, gender, degree of tumor differentiation, stage of the disease and tumor histological characteristics.

**Conclusions/Discussion:** This study revealed that there was less than 30% MMR protein loss in colorectal cancer patients in north India. Loss was more commonly found in right sided colon cancer than left. A larger study is further required to validate these findings

### THE COMPARISON OF TA-NOSE ISR MADE BY SINGLE STAPLING, DOUBLE POUCH SUTURING AND TRADITIONAL LAPAROSCOPIC DIXON IN RECTAL CARCINOMA.

P319

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Zhengzhou, China

**Purpose/Background:** To compare the effect of ta-NOSE ISR made by single stapling double pouch suturing and traditional laparoscopic Dixon of rectal carcinoma, we study economic, safe and micro-invasive way of colorectal anastomosis.

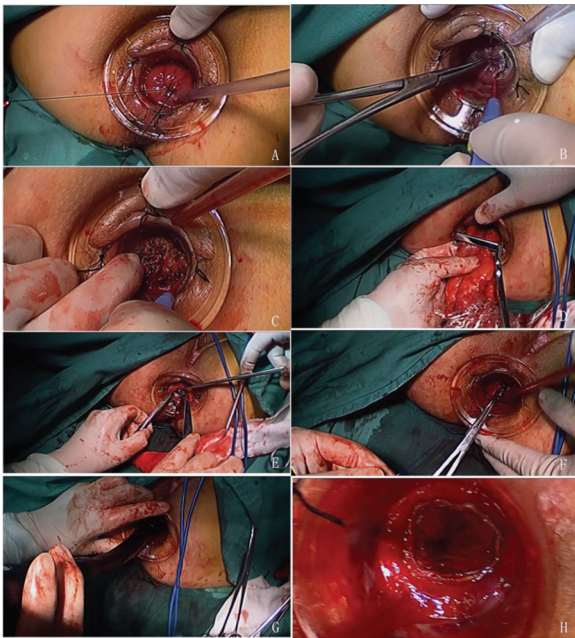
**Methods/Interventions:** The case-control study was applied to analyze the clinical outcomes of the 83 cases with rectal cancer in the time November of 2015 to October 2016, in which 40 cases were undergone by single stapling double pouch suturing of ta-NOSE ISR, 43 cases by traditional laparoscopic Dixon. All the patients are at the stage of T1-2 tumors which does not invade the external sphincter.

**Results/Outcome(s):** The ta-NOSE ISR group was lower than the Laparoscopic Dixon group of the hospitalization costs and incidence of postoperative anastomotic leakage (P<0.05). There was no significant difference between the two groups in the duration of hospitalization, in the operative time recovery time of gastrointestinal function, tumor recurrence rate,as well as intraoperative blood loss. Comparing the rate of anastomotic stricture, urethral dysfunction, defecation dysfunction, postoperative infection in the two groups, it also had no statistical difference.

**Conclusions/Discussion:** In the resection of rectal cancers, single stapling double pouch suturing of ta-NOSE ISR and traditional Laparoscopic Dixon contribute considerably, but the former reduces the cost of hospitalization and the rate of postoperative anastomotic leakage which is more economic and safe. At the same time, ta-NOSE ISR removes the specimens through the anus and the abdomen only trocar hole left, which has advantage of minimally invasive. That is to say, single stapling double pouch suturing of ta-NOSE ISR is economic, safe and micro-invasive as an ultralow sphincter-preserving surgery.

#### P318 Pattern of MMR Loss in patients with colo-rectal cancer

MMR protein Loss	No. of Patients
MSH2+MSH6	6(11.5%)
PMS2 Only	5(9.6%)
MSH6 Only	3(5.8%)
MLH1+PMS2	1(1.9%)



#### ADENOMA DETECTION RATE IN SURVEILLANCE COLONOSCOPY FOLLOWING COLON RESECTION FOR BENIGN AND MALIGNANT DISEASE.

P320

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**Purpose/Background:** According to the ASCRS Practice Guideline for the Surveillance of Patients After Curative Treatment of Colon & Rectal Cancer, surveillance colonoscopy should be performed at 1 year after pre-op colonoscopy in patients with high-risk stage I, stage II, stage III, or stage IV (with isolated metastasis) colon cancer. However, the phenotypic features of the index tumor have not been correlated to the adenoma detection rate (ADR) during surveillance colonoscopy. We sought to determine the potential effect of the index tumor grade, stage, and colonic segment on surveillance ADR.

**Methods/Interventions:** A retrospective analysis of primary colon resections and initial surveillance colonoscopies performed by three private practice colon & rectal surgeons from 2012-2015 was completed. Only patients who underwent pre- or peri-operative endoscopic clearance of the colon were included. Pathology reports were reviewed for each colon resection, and correlated to the findings of the respective surveillance colonoscopy (including polyp size, location, and morphology). Patients with known hereditary polyposis syndromes, inflammatory bowel disease, obstructing colon cancer, stage IV colon cancer, or any-stage rectal cancer were excluded.

**Results/Outcome(s):** Seventy surveillance colonoscopies were performed by one of three private practice colon & rectal surgeons between 2012-2015 on patients who had

previously undergone segmental colon resection either for benign, unresectable polyps (n=24) or malignant disease (stage I-III) with curative intent (n=46). The overall surveillance ADR was 30.0% (33% for benign disease, and 28.2% for malignant disease). Male ADR was 34.2%. Female ADR was 25%. The overall polyp detection rate (PDR) for benign and malignant disease was statistically equivalent at 45.8% and 45.6%, respectively. Of the 46 patients who underwent curative resection for colon cancer, one recurrence was detected on surveillance colonoscopy (2%).

**Conclusions/Discussion:** Neither tumor grade nor colon cancer stage was a significant independent predictor of surveillance ADR. There was no significant difference in ADR when comparing right vs left colon resections independent of grade/stage. However, when tumor grade and stage were analyzed collectively, there was a trend towards higher ADR in patients with grade II/III and stage II or III disease (as compared to benign or stage I disease). Large, prospective, multi-center studies are needed to fully assess the potential effect of tumor grade and stage on surveillance ADR. A significant correlation would allow for the development of a targeted surveillance colonoscopy algorithm based on phenotypic features of the index tumor.

#### DELAYED PRIMARY CLOSURE AFTER COLECTOMY TO REDUCE SURGICAL SITE INFECTION.

P321

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**Purpose/Background:** Surgical site infection (SSI) rate following colectomy is increased (up to 30%) compared to non-colorectal procedures (average 5%). Numerous institutions have studied methods to decrease SSI following colectomy, but the interventions have been costly and the results difficult to replicate. Intricate "bundles" have been employed to reduce SSI, but it is unclear which of the components truly contribute to SSI reduction. Delayed primary closure as a means to reduce SSI rates following colectomy is an accepted practice, but it has not been studied in the literature.

**Methods/Interventions:** A retrospective study was performed in which patients who underwent colectomy had either the laparotomy or colon extraction site incision closed in a delayed primary closure fashion. The fascia was closed with running 1-PDS or 0-PDS, then 2-0 nylon sutures were placed every 2 centimeters in a vertical mattress fashion. These nylon sutures remained untied and the subcutaneous tissue packed with moist dressing for 48 hours. After the 48-hour time period had elapsed, the nylon sutures were tied to approximate the skin. Please see our attached video for technique details. The sutures were then removed at the first post operative visit. Surgical site

infections were documented according to the Center for Disease Control definitions.

**Results/Outcome(s):** Thirty-two patients underwent delayed primary closure following colectomy. All patients received preoperative broad-spectrum antibiotics within 30 minutes of the incision time. SCIP measures were adhered to in all 32 patients. Fifteen patients underwent open colectomy, while 17 underwent minimally invasive colectomy. No patients (0%) were noted to have superficial, deep, or organ space SSIs during their postoperative in-hospital stay nor at the 30-day postoperative mark.

**Conclusions/Discussion:** The technique used in this study shows that delayed primary closure is a potential alternative to primary closure to prevent SSI after colectomy. Considerable cost savings can be seen by avoiding the sequelae of SSI. Delayed primary closure with nylon suture alone allowed our institution to avoid costly and complicated “bundles” to decrease SSI rates. A randomized control trial is currently being initiated at our institution between primary closure and delayed primary closure to assess SSI rates and cost associated with SSI reduction.

### IS CHEMORADIOTHERAPY ALONE ENOUGH IN ADVANCED RECTAL MALIGNANCY WITH POSITIVE EXTRA MESORECTAL LATERAL LYMPH NODES?

P322

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**Purpose/Background:** Total Mesorectal Excision (TME) has revolutionised loco-regional recurrence rates in rectal cancer. There is a move to focus “beyond the TME” and pelvic exenteration is now recognised as salvage surgery for advanced malignancy. Extra-mesorectal nodal disease is regarded as local metastatic disease and optimal management of these Lateral pelvic lymph nodes remain unclear, with no consensus on best practice. Chemoradiotherapy (CRT) vs. Lateral pelvic lymph node dissection (LPLD) has been evaluated in the literature with no clear conclusions. However little has been done to ascertain the rate of positive lymph nodes following CRT. The aim of this study was to determine the rate of positive lymph nodes following CRT in advanced rectal cancer.

**Methods/Interventions:** Retrospective case note analysis of all patients undergoing LPLD for advanced rectal cancer over a 15-year period (2001 -2016). Patient’s preoperative imaging (CT/MRI +/- PET) was analysed for initial nodal status. All patients received neo-adjuvant CRT. Pathology reports were analysed for node positivity, which were correlated to preoperative imaging. Patients with pelvic sepsis were excluded from analysis. Data was analysed using SPSS v 24.

**Results/Outcome(s):** Sixty Six (N=66) patients underwent LPLD in the study period. 41/66 (62%) were male. All patients underwent neoadjuvant CRT. LPLD was performed as part of the radical pelvic surgery with curative intent. 59/66 (89%) patients underwent pelvic exenteration and 8 patients (11%) had TME dissection. 20/66 patients (29%) had primary rectal adenocarcinoma and 47/66 (71%) had recurrent disease. The rates of LN clearance were as follows; external iliac nodes 58/66 (88%), internal iliac nodes 65/66 (99%), common iliac nodes 64/66 (97%), obturator nodes 45/66 (68%), bifurcation 21/66 (32%), median sacral nodes 23/66 (34%), and para-aortic nodes 14/66 (21%). 33% (21/66 patients) had histopathologically proven positive nodes. 44% (18/41) of patients, who had positive nodes on pre-operative imaging, had positive pathology despite CRT. 13% (3/23 patients) with negative imaging had positive pathology.

**Conclusions/Discussion:** CRT successfully treats nodal disease in two thirds of patients. In the remaining third CRT alone is inadequate, and despite radical surgery leaves residual nodal disease. LPLD is not without morbidity but is a necessary tool in achieving R0 resection in these complex cases. Re-assessment of nodal status with post CRT imaging could be one strategy to reduce the rate of unnecessary LPLD in such patients.

### MANAGEMENT OF MALIGNANT INGUINAL LYMPHADENOPATHY IN LOCALLY ADVANCED PRIMARY AND RECURRENT RECTAL CANCER.

P323

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**Purpose/Background:** The incidence of malignant inguinal lymphadenopathy occurs in 0.3 -17 % of patients with rectal cancer. It is associated with a median survival of 13.5 months. Optimal treatment of these patients is unclear with chemotherapy and radiotherapy being the main treatment modalities. The role of surgery is well established in patients with breast and skin cancers; however, in rectal cancer there is still equipoise. The aim was to compare the outcomes of surgery and radiotherapy in the treatment of malignant inguinal lymph nodes (MILN) in patients with primary and recurrent rectal cancer.

**Methods/Interventions:** A retrospective study was performed on a prospective database. 13 patients (0.9%) were identified with MILN from a total of 1450 patients between 2001-2014. All 13 patients underwent treatment for curative intent. Five (5) patients (13.8%) underwent radiotherapy alone and 8 (61.5%) underwent radiotherapy and surgery. In the surgical group 50% had a groin dissection and 50% had “cherry-picking”.

**Results/Outcome(s):** Morbidity occurred in 37% of patients in the surgical group. There was no treatment

related mortality in either group. Recurrence rates were higher in the surgical group with 5 patients (62.5%) vs. 1 patient in the radiotherapy alone group. The mean time to recurrence was 25.3 months. The mean survival was 36 months.

**Conclusions/Discussion:** The study highlights the rarity of the pathology. Currently there is no guidelines to steer treatment algorithm towards one pathway or another. It is interesting that recurrence in this group is higher with duo modality of surgery and radiotherapy, versus radiotherapy alone. Due to the small sample size, firm conclusions cannot be drawn at present. A multicentre study is currently underway to further analyze these findings.

### IS LAPAROSCOPIC RESECTION THE GOLD STANDARD IN TREATMENT OF SMALL BOWEL NEOPLASMS? ONE CENTER EXPERIENCE.

P324

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**Purpose/Background:** Small bowel neoplasms (SBN) represent a heterogeneous group (more than 40 sub-types) of gastrointestinal neoplasms with a low incidence (0.3% of all tumors) that has been growing over the last 30 years. Treatment modality and oncological outcome significantly varies depending on the histological type but surgery generally represents the first-line therapy. In colorectal cancer laparoscopic surgery (LPS) guarantees the same oncological outcome of open approach and is associated with several advantages in terms of post-operative and aesthetic outcome. Except for gastrointestinal stromal tumors (GIST), there are no randomized studies that demonstrated the oncologic safety of a laparoscopic approach in SBN. Aim of this study is a prospective analysis of surgically treated SBN with a minimally invasive approach.

**Methods/Interventions:** Patients affected by SBN (jejunum and ileum) and surgically treated in our unit from 2007 to 2014 were enrolled in a prospective database. Pre-operative clinical data, intra and post-operative complications and pathological features were recorded. All patients entered in a follow-up program to establish oncological outcome in terms of disease recurrence (DR) overall survival (OS) and disease-free survival (DFS).

**Results/Outcome(s):** From 2007 to 2014, 37 patients (20 female; median age: 65 years) affected by SBN were treated in our surgical unit. The most frequent affected site was jejunum 24 cases (64.9%) and the most frequent histotypes were adenocarcinomas and GIST (35%). In 15 cases (40.5%) the disease was symptomatic; massive occult bleeding in 12 cases (32.4%) and bowel obstruction in 3 (8.1%). All patients were radically (R0) treated, 24 (64.8%) of them with a LPS approach. The rate of LPS

procedure increased from 43% in the first 3 years to 78% in the last 3 years. The higher rate of LPS was for GIST (92.3%) and the lowest for adenocarcinomas (38%). A LPS approach was possible in a third of symptomatic SBN (33.3%). No intra-operative complications and no early post-operative death were recorded. Post-operative complications according to Clavien's classification occurred in 8 patients (21.6%): 2 (5.4%) grade I, 5 (13.5%) grade II and 1 (2.7%) grade III (re-operation required for massive bleeding). In LPS group the rate of p.o. morbidity was 16.7% vs 30.8% in the OPEN group. Median p.o. hospital stay was 6 days (5.5 days in LPS group vs 7 days in OPEN group). In adenocarcinomas group a recurrence occurred in 7 patients (53.8%) and mean OS and DFS were respectively 39 and 30 months. In GIST group, only 1 recurrence was observed (7.7%) and mean OS and DFS were respectively 71 and 70 months.

**Conclusions/Discussion:** Laparoscopic surgical resection in our experience is feasible and able to deal with most of small bowel tumors. Surgery still represents the best chance of cure for these patients also if oncological outcome, despite R0 resections, mainly depends on histological type.

### IDENTIFYING COLORECTAL PATIENTS WHO WILL BENEFIT FROM EXTENDED VENOUS THROMBOPROPHYLAXIS.

P325

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**Purpose/Background:** Colorectal cancer patients undergoing surgery have an increased risk of venous thromboembolism. VTE is the most common cause of 30-day mortality in patients undergoing abdominal and pelvic operations for cancer. Currently our patients receive thromboprophylaxis during hospitalization only. However recent studies have reported that extending the duration of thromboprophylaxis for 28 days in high risk patients can reduce the risk of late VTE. There is limited information about what constitutes a high risk colorectal patient, and whether all patients undergoing pelvic or cancer surgery should receive extended prophylaxis. There is also a paucity of data on the incidence of early symptomatic post discharge VTE in colorectal cancer patients. Furthermore the cost-effectiveness of extended prophylaxis has been questioned. The aim of this study was to review our incidence of symptomatic thromboembolism and assess which colorectal patients would benefit from extended thromboprophylaxis. The secondary aim was to assess the cost effectiveness of using an extended prophylactic protocol.

**Methods/Interventions:** Retrospective data was collected from colorectal cancer patients undergoing surgery from June 2011 until June 2016. The frequency of symptomatic pulmonary embolism (PE) within 30 days of surgery was collected from medical records, imaging and

outpatient follow up. The pathological stage of disease for each patient was recorded. The estimated cost for use of enoxaparin as thromboprophylaxis for 28 days was calculated.

**Results/Outcome(s):** Five hundred and thirteen patients were identified. Seven patients developed post-operative symptomatic PE (1.36%). Post discharge PE rate was 0.78 % (4/513) and in hospital PE rate was 0.58% (3/513). Three of 5 patients had stage III/IV cancer and 2 patients had stage I/II cancer. We examined the preoperative PE rates in 300 patients. Four had symptomatic PE at the time of their initial diagnosis (1.3%). Three of these patients had stage III/IV cancer and 1 patient had stage II cancer. The estimated cost of extended prophylaxis in 513 patients would have been AUS\$63,000. The cost of treatment for 4 patients who had VTE post discharge was AUS\$40,000.

**Conclusions/Discussion:** The rate of post-operative VTE is low in our group of patients. Cost benefit analysis would support use of extended thromboprophylaxis in selected high risk patients only. These would include colorectal patients with stage III or IV disease as these patients have the highest risk of developing PE both within the perioperative and post-operative period according to our study.

#### IS IT NECESSARY A TOTAL MESORECTAL EXCISION IN PATIENTS WITH UPPER AND MIDDLE RECTAL CANCER?

P326

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**Purpose/Background:** Total mesorectal excision (TME) after neoadjuvant chemoradiation is the standard treatment for most patients with middle and lower third rectal cancer. Some surgeons propose that TME should be performed even for upper rectal tumors. However, an extensive rectal excision leads to impaired functional results. Other surgeons advocate the so-called wide mesorectal excision (WME) for upper and most mid-rectal cancer, preserving as much distal rectum as possible to improve postoperative anal function. The aim was to analyze the association between the extension of rectal and mesorectal excision with the oncological outcome.

**Methods/Interventions:** Retrospective cohort study including patients with rectal cancer above 6 cm undergoing WME between 2007 y 2012. The association between distal rectal margin and disease-free and overall survival was calculated. Patients were divided into quartiles according to the distal margin (Q1:  $\leq$  15 mm; Q2: 16-26 mm; Q3: 27-39 mm; Q4:  $\geq$  40 mm). For long-term outcomes the Kaplan-Meier method was used to estimate the probability of survival and the log-rank test to evaluate

the statistical significance of differences between survival distributions.

**Results/Outcome(s):** During the study period 99 patients were included (Q1: n=20; Q2: n=26; Q3: n=25; Q4: n=28). The tumor was located in the upper rectum in 69 patients and in the mid-rectum in 30 patients. Forty-three (43%) patients received preoperative chemoradiation. The distal margin was free in all patients and the circumferential resection margin was involved in 1 patient. The median follow-up was 44 months. Tumor recurrence was diagnosed in 14 patients: local in 5 patients and distant in 9 patients. There were no differences in 5-year disease-free survival between groups (Q1: 94,1% vs. Q2: 88% vs. Q3: 91.7% vs. Q4: 88.2%; p=0.952).

**Conclusions/Discussion:** In this cohort of patients with rectal cancer, the distance between the tumor and the distal resection margin was not associated with the oncological outcome. A WME instead of TME may be enough in patients with upper and middle rectal cancer allowing a good oncological clearance.

#### NSAID HAS NO ROLE AS STANDARD ANALGESIC TREATMENT FOLLOWING LAPAROSCOPIC COLORECTAL CANCER RESECTION. CANCELLATION OF IBUPROFEN FROM THE STANDARD POSTOPERATIVE ANALGESIC TREATMENT DOES NOT INCREASE OPIOID CONSUMPTION OR LENGTH OF STAY AFTER ELECTIVE LAPAROSCOPIC COLORECTAL CANCER RESECTION.

P327

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**Purpose/Background:** Many standard postoperative analgesic regimens after colorectal cancer surgery includes an NSAID in combination with paracetamol and other analgesics. Concerns about the association between NSAID use and anastomotic leakage have questioned the rationale of NSAID use in the postoperative period and the need for possible alternatives. In our department, we decided to remove NSAIDs from the standard analgesic package, from 1 April 2016, without other analgesic substitution. The aim of the present study was to compare patients' opioid consumption and length of stay before (+NSAID) and after (-NSAID) 1 April 2016.

**Methods/Interventions:** Patients undergoing elective laparoscopic colorectal resection for cancer were eligible for the study. Patients with chronic preoperative opioid use and patients undergoing a reoperation in universal anesthesia, for any reason, were excluded. We identified 100 consecutive patients before 1 April 2016 and 100 consecutive patients after 1 April 2016 meeting these criteria. Demographic and perioperative data including length of stay and opioid consumption in hospital was

retrospectively collected from the electronic patient journal system (OPUS). Total PRN (pro re nata) opioid consumption in hospital was calculated as oral morphine equivalent doses in mg (mg omeq).

**Results/Outcome(s):** The two groups were comparable in terms of gender, age and tumor location. There was no difference in opioid consumption in hospital between the non-NSAID (40 mg (10-165)) and NSAID group (30 mg (10-920)),  $p=0.277$ . Length of stay was median 3 (1-11) days in the non-NSAID group and 3 (1-14) days in the NSAID group ( $p=0.652$ ).

**Conclusions/Discussion:** Paracetamol alone is as effective as Paracetamol in addition with NSAID as standard postoperative analgesic package in terms of opioid consumption and length of stay in hospital.

### RISK FACTOR AND SITE ASSESSMENT OF LOCAL RECURRENCE AFTER LAPAROSCOPIC LOWER RECTAL CANCER RESECTION.

P328

S. Yamaguchi, T. Ishii, J. Tashiro, H. Kondo, K. Hara, H. Shimizu, K. Takemoto, A. Suzuki  
*Hidaka, Japan*

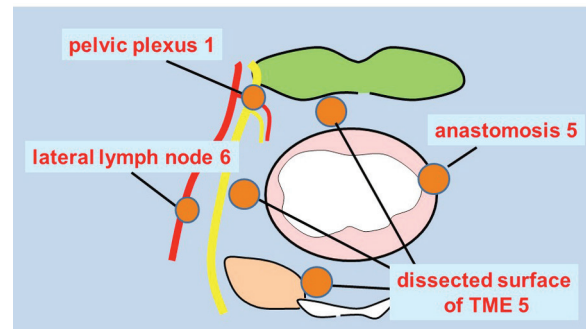
**Purpose/Background:** Recent studies suggested that circumferential radial margin of laparoscopic resection was approximately 5 % more positive than that of open resection for rectal cancer. This study assessed retrospectively, survival, local recurrence (LR) rate, risk factor, and recurrent site in the pelvis after lower rectal cancer resection.

**Methods/Interventions:** Since May 2007 to February 2015, 264 patients underwent curative lower rectal cancer resection. Characteristics were as follows; 181 males and 83 females, mean 63.5 years old, preoperative chemoradiotherapy (CRT) 9 (3.4%), pathological CRM positive 6 (2.3%), lateral lymphadenectomy 30 (13 positive patients), and mean follow up 40.2 months.

**Results/Outcome(s):** Five year overall survival and 3 year relapse free survival were 95.1%, 93.6% in stage I, 87.1%, 85.5% in stage II, and 79.3%, 78.0% in stage III, respectively. LR was observed 17 patient (6.4%). Factors of significant LR difference were; gender male 4.4% vs. female 10.8% ( $p=0.048$ ) and surgeon A 2.8% (4/145) vs. 12.1% (7/58) ( $p=0.03$ ). Other factors were not significant LR difference; Stage I 5.0%, II 10.5%, III 4.5%, lateral lymph node positive 7.7%, negative 6.4%, procedure: LAR 4.7%, ISR 10.5%, APR 4.5%, preop-CRT 11.1%, non-CRT 6.3%, anastomotic leak 0% (0/16), non-leak 6.9%. Site of LR was; anastomosis 5, lateral lymph node 6, pelvic plexus 1, and dissected surface of TME 5 which included levator muscle 2, pre-sacrum 1, pre-piriformis 1, and recto-vaginal 1. These 5 patients (1.9%) had possibility of cancer implantation at rectal dissection. Currently, 6 patients of LR were cancer free by surgical resection of 3 anastomotic, 2 lateral LN, and 1 rectovaginal.

**Conclusions/Discussion:** Risk factors of LR were surgeon and gender female, also most of LR was not caused by radial mesorectal dissection in this patient series.

### 【Site of Local Recurrence】



### NOMOGRAM TO PREDICT ANASTOMOTIC LEAKAGE AFTER ANTERIOR RESECTION FOR RECTAL CANCER MULTIVARIATE ANALYSIS AND NOMOGRAM FROM A SINGLE-CENTRIC, RETROSPECTIVE, CHINESE STUDY WITH 5197 PATIENTS.

P329

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**Purpose/Background:** Anastomotic leak (AL) is still one of the most dreaded complications after anterior resection for rectal cancer. This study aimed to identify pre-/intraoperative risk factors for AL after anterior resection for rectal cancer and to develop a practical method for predicting postoperative AL risk.

**Methods/Interventions:** 5197 patients who underwent anterior resection for rectal cancer with primary anastomosis, with or without diverting stoma, between January 2006 and April 2016 were included in a single-center, retrospective study. Thirty clinical variables, related to patient, cancer, and surgical procedure were examined as potential risk factors by univariate and multivariate analyses. A nomogram was developed to predict risk of postoperative anastomotic leakage for patients with different characteristics.

**Results/Outcome(s):** The rate of anastomotic leak was 6.9% in our patients. Multivariate analysis identify the following variables as independent risk factors of anastomotic leak: Male gender ( $P < 0.001$ , odds ratio (OR) = 2.508], diabetes mellitus ( $P = 0.009$ , OR = 1.632), a long distance from rectal cancer to the anal verge ( $P < 0.001$ , OR = 0.839), laparotomy ( $P = 0.001$ , OR = 0.494), diverting stoma ( $P < 0.001$ , OR = 0.373), long surgery duration ( $P < 0.001$ , OR = 1.010), intra/post-operative bleeding in anastomosis ( $P < 0.001$ , OR = 7.105), unsatisfied intraoperative anastomosis ( $P < 0.001$ , OR = 5.854). The created nomogram showed good accuracy for

predicting anastomotic leakage risk, with a concordance index 0.79.

**Conclusions/Discussion:** Both patients and surgical technique have an important effect on anastomotic leak. Our nomogram has an accurate evaluation utility to predict risk of anastomotic leak after anterior resection of rectal cancer.

## RECTAL CANCER WITHOUT RESPONSE TO NEOADJUVANT TREATMENT: DON'T WATCH OR WAIT.

P330

L. Duraes, L. Stocchi, J. Church, T. Plesec, M. Kalady  
Cleveland, OH

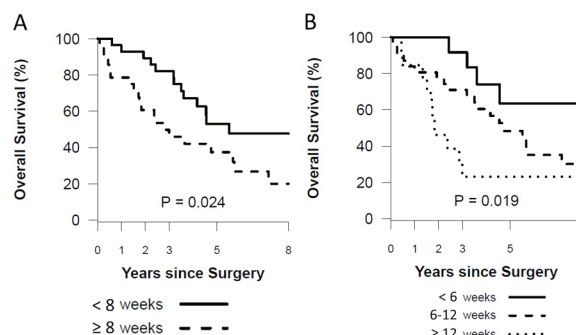
**Purpose/Background:** Neoadjuvant chemoradiation (nCRT) therapy is recommended for locally advanced rectal cancer in the middle and lower rectum. Longer intervals between nCRT and surgery has been associated with improved pathological response. However, about 20% of patients have minimal or no response to nCRT. We hypothesized that prolonging the interval to surgery in the subgroup of non-responders could hinder oncologic outcomes by delaying care of a biologically unresponsive tumor.

**Methods/Interventions:** A single institution colorectal cancer database was queried for patients with pathologic stage II-III rectal adenocarcinoma treated by nCRT and proctectomy for curative intent between 2000 and 2012. The study population included those with pathologic poor or no response to nCRT according to the American Joint Committee on Cancer regression score (AJCC 3). Oncologic outcomes of this population of non-responders was evaluated according to the time interval between completion of nCRT and surgery, using a single time point of more or less than 8 weeks, and then using different intervals: < 6 weeks, 6-12 weeks, or  $\geq$  12 weeks. Univariate and Kaplan-Meier analysis were performed, and  $p < 0.05$  was considered statistically significant.

**Results/Outcome(s):** 272 rectal cancer patients had recorded AJCC scores following nCRT and proctectomy, of which 56 patients had minimal response (AJCC 3), confirmed by histopathology. No difference was observed in age ( $p = 0.36$ ), gender ( $p > 0.99$ ), pathologic stage ( $p = 0.79$ ), and pathologic differentiation ( $p = 0.62$ ) between different time intervals. However, the 28 patients surgically treated  $\geq$  8 weeks after completion of nCRT had worse overall survival (37% vs. 53%,  $p = 0.024$ ), and disease free survival (31% vs. 49%,  $p = 0.050$ ), and a trend to worse cancer specific survival (53% vs. 61%,  $p = 0.155$ ) compared to patients < 8 weeks. Using the 3 different intervals for analysis, waiting longer in the non-responders was consistently associated with worse overall survival (23% vs. 48% vs. 63%,  $p = 0.019$ ), cancer-specific survival (35% vs. 61% vs. 71%,  $p = 0.047$ ), and a trend for worse disease-free survival

(23% vs. 37% vs. 66%,  $p = 0.121$ ) for the  $\geq$  12 weeks, 6-12 weeks, and < 6 weeks, respectively (see figure).

**Conclusions/Discussion:** For rectal cancer patients who are non-responders to nCRT, a longer interval to surgery is associated with worse oncologic outcomes. We recommend early clinical evaluation of response approximately 4 weeks after nCRT, with the plan to expedite surgery for these patients with minimal or no tumor response.



Overall Survival for patients non-responders to neoadjuvant chemoradiation, according to the time interval between completion of nCRT and surgery, using a single time point of more or less than 8 weeks (figure A), and using different intervals: < 6 weeks, 6-12 weeks, or  $\geq$  12 weeks (figure B).

## OPTIMISING RADIOTHERAPY DOSE COMBINED WITH CHEMOTHERAPY FOR ANAL CANCER – THE DEVELOPMENT OF THREE CLINICAL TRIALS (INCLUDING THE SURGICALLY-BASED ACT 3) ACROSS THE LOCO-REGIONAL RISK SPECTRUM (PLATO TRIAL).

P331

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**Purpose/Background:** Previous phase III trials of squamous cell cancer of the anus have determined radiotherapy with concurrent Mitomycin C and 5FU as the standard of care. Following the introduction of Intensity Modulated Radiotherapy (IMRT), we developed an umbrella platform of three trials (including a surgically-based evaluation) addressing treatment questions across the loco-regional disease risk spectrum.

**Methods/Interventions:** We formed a network of UK and international multi-disciplinary trialists and identified the following research questions: i) can a highly selective policy of involved field chemo-radiotherapy (CRT) result in low loco-regional failure (LRF) in small anal margin tumours treated by local excision, ACT 3?; ii) can reduced dose CRT using IMRT achieve an acceptably low rate of

LRF in early stage anal cancer, ACT 4?; iii) can radiotherapy dose escalation reduce the LRF rate with acceptable toxicity in locally advanced disease, ACT 5?

**Results/Outcome(s):** The PLATO (Persona Lisingr Adio TherapydOse in anal cancer, ISRCTN 88455282) is a platform comprising of the ACT3, 4 and 5 trials and funded by Cancer Research UK. It is due to commence recruitment in Q4 2016. The ACT 3 trial is a non-randomised phase II study that will evaluate a strategy of local excision for T1N0 anal margin tumours (and including anal canal superficial invasive squamous cell carcinoma, SISCCA) with selective post-operative involved field CRT using 41.4Gy in 23 fractions and concurrent capecitabine, reserved for patients with margins  $\leq$  1mm. Margin negative tumours (expected to be greater than 80%) are observed. An exact single-stage A'Hern design is used. Efficacy can reach 90%; unacceptable efficacy ( $<$  80%), such that 90 patients are required (including 10% drop-out rate). Imaging includes baseline pelvic MR and CT chest abdomen-pelvis; and pelvic MR at 36 months. The primary endpoint for each trial is 3 year LRF. Toxicity assessment includes: acute toxicity CTCAE; and baseline and sequential PROMS (EORTC QLQ C30 and Anal cancer module, ANL27).

**Conclusions/Discussion:** The PLATO trial concept is efficient with a single funding application and protocol but supports three separate clinical trials. There are clear opportunities for recruitment through surgical pathways. For the patient there is a single patient information sheet for the specific trial relevant to their disease stage. This approach is increasingly important in the era of personalised cancer medicine. Sharing the details of this concept should assist other investigators to develop similar future studies in other disease sites.

### TOTALLY LAPAROSCOPIC RECTUM RESECTION WITH TRANSANAL SPECIMEN EXTRACTION.

P332

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**Purpose/Background:** To evaluate the feasibility, safety and short-term outcomes through technical aspects of rectal resection followed by transanal specimen extraction.

**Methods/Interventions:** 52 consecutive patients with rectal tumor underwent laparoscopic resection followed by transanal specimen extraction over a period of one year and a half. All the patients were satisfied with inclusion criteria of this approach. Intraoperative data as well as short-term outcomes were evaluated respectively.

**Results/Outcome(s):** The laparoscopic rectal resection followed by transanal specimen extraction was successfully carried out in all of the patients without intraoperative conversion and additional access. The mean operation

time was 185.2 min, the mean blood loss was 35.5 ml, the mean postoperative exhaust time was 32.0 hours, and the mean length of hospital stay was 8.5 days. One of the patients was detected with anastomotic leakage postoperatively who was dealt with antibiotic course and daily pelvic cavity flush. No infection-related complications and anal incontinence were observed. The mean size of the tumor was 2.2 cm, the mean number of harvested lymph nodes was 16.5 and the mean follow-up time was 8.5 months. No signs of recurrence in any of these patients were found till to the last follow-up.

**Conclusions/Discussion:** The combination of standard laparoscopic resection and transanal specimen extraction could be a well-established strategy and may be considered as an alternative procedure to the conventional laparoscopic resection.

### IS EXTENDED VTE PROPHYLAXIS AFTER MINIMALLY INVASIVE SURGERY FOR COLORECTAL CANCER JUSTIFIED? RESULTS OF A SYSTEMATIC LITERATURE REVIEW.

P333

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**Purpose/Background:** There is wide variability in the administration of extended venous thromboembolism (VTE) prophylaxis following colorectal cancer surgery. Multiple guidelines recommend extended VTE prophylaxis for 4 weeks post-operatively following abdominal or pelvic cancer surgery, particularly for high risk patients. Our aim was to synthesize the evidence from randomized controlled trials assessing the efficacy and safety of extended VTE prophylaxis following minimally invasive surgery (MIS) among patients with colorectal cancer.

**Methods/Interventions:** A systematic literature review was conducted (MEDLINE & EMBASE) and studies meeting the following inclusion criteria were retrieved; i) randomized controlled trials, ii) adult patients undergoing elective colorectal surgery, iii) patients randomized to either the administration of extended VTE prophylaxis or inpatient VTE prophylaxis. The primary outcome of interest was the frequency of symptomatic or asymptomatic VTE events. Random-effects meta-analyses were planned using both a frequentist and Bayesian approach. We intended to assess heterogeneity using I-squared values and risk of bias using the Cochrane Risk of Bias Tool.

**Results/Outcome(s):** Five randomized controlled trials met the inclusion criteria (Table 1). These studies were published between 1998 and 2014. One study focused specifically on patients undergoing MIS for colorectal cancer (n=225). Three studies included patients undergoing open procedures only (Berqvist *et al.*, Kakkar *et al.* and Rasmussen *et al.*). The remaining study evaluated



general surgery patients with both benign and malignant conditions (Lausen *et al.*); notably, data are not presented separately for colorectal surgery patients. It is unclear whether this latter study published in 1998 included MIS procedures. Clinical heterogeneity was also encountered between studies with regards to the definition of the intervention (i.e. different pharmacologic agents used) and comparator group (i.e. use of placebo). Additionally, methodological heterogeneity was observed in the definition of the outcome and methods for outcome assessment. Of note, most studies were undertaken in the pre-ERAS era. The paucity of data and heterogeneity encountered precluded an attempt at a meta-analysis.

**Conclusions/Discussion:** There is limited data on the efficacy and safety of extended VTE prophylaxis after minimally invasive surgery for colorectal cancer. Additional investigations are required before endorsing extended VTE prophylaxis for this patient population.

### P333 Characteristics of included studies

Year	Study	Population	Number of patients randomized	Number of CRS patients	Patients undergoing MIS	Intervention vs control group	Outcome assessment & timing
1998	Lausen <i>et al.</i>	Major abdominal/ noncardiac thoracic surgery	118	66	Unknown	LMWH (tinzaparin 3500 IE) x 4 weeks vs LMWH (tinzaparin) x 7 days	Venography at day 28
2002	ENOXACAN II Bergqvist <i>et al.</i>	Major abdominal/pelvic cancer surgery	332	Unknown*	No	LMWH (enoxaparin 40 mg) x 25-31 days vs LMWH (enoxaparin) x 6-10 days followed by placebo x 19-21 days	Blinded venography between day 25 and 31
2006	FAME Rasmussen <i>et al.</i>	Major abdominal/pelvic surgery	343	232	No	LMWH (dalteparin 5000 IE) x 28 days vs LMWH (dalteparin) x 7 days	Blinded venography at day 28
2010	CANBESURE Kakkar <i>et al.</i>	Major abdominal/pelvic cancer surgery	488	412	No	LMWH (bemiparin 3500 IU) x 28 ± 2 days vs LMWH (bemiparin) x 8 ± 2 days followed by placebo for 20 ± 2 days	Blinded venography at day 18-22 and 74-90.
2014	PROLAPS Vedovati <i>et al.</i>	Laparoscopy for colorectal cancer	255	255	Yes	Any LMWH x 4 weeks vs LMWH x 8 ± 2 days	Blinded compression ultrasonography at day 28 ± 2 days

CRS, colorectal surgery. MIS, minimally invasive surgery. LMWH, low molecular weight heparin. DVT, deep venous thrombosis. PE, pulmonary embolism.

\* 278 patients underwent gastrointestinal tract surgery

## COMBINED ENDOSCOPIC LAPAROSCOPIC SURGERY, CELS, A PROCEDURE SUITED FOR BENIGN AND MALIGNANT COLONIC NEOPLASIA.

P334

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**Purpose/Background:** Depending on size, localization and histopathology patients with colonic neoplasias, may be offered different types of treatment, ranging from endoscopic resection to open surgery. A proportion of patients with benign colonic neoplasias are unsuitable for endoscopic removal due to difficult to visualize, maintaining a stable position during intervention or high risk of perforation. These lesions that are unsuitable for endoscopic removal are often segmentally resected and therefore with the risk of surgical complications. To avoid this, CELS procedure is an option, including high-risk patients with early detected small malignant tumors.

**Methods/Interventions:** All patients considered for CELS procedures, were evaluated at a multi-disciplinary team conference consisting of endoscopists and colorectal surgeons, and if malignant diagnose had already been established; radiologist, oncologist and pathologist. Before evaluation, CT scan and histopathological diagnosis were provided. CELS procedures were performed with either endoscopic EMR resection and laparoscopic assistance, or laparoscopic resection with endoscopic assistance. In the latter case, stapling off the neoplasm was performed. The patients were selected based on either being endoscopic non-resectable or high risk patients with established malignant diagnose and deemed unfit for large oncological surgical resection.

**Results/Outcome(s):** We present 10 CELS procedures (Table 1), 4 patients with malignant diagnose and 6 patients with benign diagnose. In the malignant group, 2 patients were known to have malignant disease, but were deemed unfit for oncological resection due to severe comorbidity. In one patient with initially benign biopsies, the resected CELS specimen revealed adenocarcinoma. This patient underwent subsequently oncological resection with hemicolectomy and histopathology demonstrated no sign of residual tumor and there were no signs of metastatic disease. In all the benign CELS cases resection margins were free or on follow up without residual adenoma. In all cases there were no severe complications, but one patient developed subcutaneous hematoma at one of the laparoscopic port site.

**Conclusions/Discussion:** CELS is a feasible treatment for colonic neoplasia where endoscopic resection alone is not technically possible or where comorbidity in the patient, diagnosed with T1 or T2 colorectal cancer, rules out larger segmental resection. The approach to implementing CELS procedures requires a set up with MDT conferences, a highly specialized endoscopic team and a

large volume colonic surgical center with both benign and malignant expertise.

Table 1.

No	Indication	Size	Histology before CELS	Location	Procedure	Histology	LOS (days)	Complications
1	Non-lifting polyp	50mm	Adenoma LGD	Cecum	Stapling	Adenoma HGD	3	None
2	Comorbidity(1)	17 mm	Adenocarcinoma	Ascendens	Stapling	Adenocarcinoma	3	None
3	Non-lifting polyp	80 mm	Adenoma LGD	Cecum	piecemeal-EMR	Adenoma HGD	1	None
4	Non-lifting polyp	15 mm	Sessile serrated laesion	Cecum	EMR + stapling	Sessil serrat laesion	3	Subc.haemaetoma at port site
5	Size and location	70 mm	Adenoma LGD	Ascendens	piecemeal-EMR	Adenoma LGD	3	None
6	Anatomical location	30 mm	Adenoma LGD	Cecum	Stapling	Adenoma LGD	1	None
7	Non-lifting polyp	17 mm	Adenoma HGD	Ascendens	Stapling	Adenocarcinoma	2	None
8	CT verified pathology(2)	70mm	none	Ascendens	lap.surgery	Adenocarcinoma	5	None
9	Comorbidity(1)	25 mm	Adenocarcinoma	Ascendens	Stapling	Adenocarcinoma	1	None
10	Non-lifting polyp	20mm	Adenoma LGD	Splenic flexure	declined->eFTR			

1. comorbidity: contra indicated standard oncological resection the lesion could not be reached alone with endoscope, due to large inguinal hernia containing the sigmoid colon. However, with CELS the lesion was reached and endoscopic assessment revealed malignancy.

LGD: low-grade dysplasia. HGD: high-grade dysplasia. EMR: endoscopic mucosal resection. eFTR: endoscopic full thickness resection.

## IMPORTANT DIFFERENCES IN THE QUALITY OF POLYPECTOMY IN PATIENTS WITH SCREEN-DETECTED AND SYMPTOMATIC COLORECTAL POLYP CANCERS.

P335

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**Purpose/Background:** The unexpected diagnosis of cancer within an excised colorectal polyp presents clinicians with a treatment dilemma. The decision as to which patients should be offered further surgery in the form of segmental resection is difficult and often based on whether the focus of cancer was completely excised. This study was designed to evaluate how the quality of polypectomy impacts on treatment decisions in screen-detected and symptomatic polyp cancers.

**Methods/Interventions:** This study included all patients with a colorectal polyp cancer diagnosed at a tertiary referral centre in Scotland between April 2000 and December 2015. Patients were divided into those detected through the national bowel screening programme (SCREENED) and those diagnosed following referral for investigation of gastrointestinal symptoms (SYMPTOMATIC). Data was collected on endoscopic findings, polypectomy technique, polyp histology and treatment allocation. Operative outcomes and rates of residual disease were compared in the patients who underwent segmental resection.

**Results/Outcome(s):** 127 patients with colorectal polyp cancers were included (67 screened; 60 symptomatic). There were no differences in polyp size (<10mm versus >10mm, p=0.57) or morphology (pedunculated versus sessile, p=0.75) between screened and symptomatic patients. Despite this, symptomatic polyp cancers were significantly more likely to be resected in a piecemeal fashion (36% versus 17%, p=0.016) and rates of complete histological excision were significantly lower (55% versus

81%,  $p=0.008$ ). Overall, 20/60 (33%) of symptomatic patients and 15/67 (22%) of screened patients went on to have a segmental resection. There were no differences in operative outcomes, the number of complications or rates of residual disease between the two groups.

**Conclusions/Discussion:** In patients with colorectal polyp cancers, the quality of initial polypectomy is worse in patients referred through the symptomatic pathway. This is important because higher rates of piecemeal resection and subsequent margin involvement appear to impact on the number of patients that are offered segmental resection. The reasons for these differences are unclear but the fact that screening lists are reserved for endoscopists with Joint Advisory Group (JAG) certification may be relevant.

### HPV 16/18 TESTING HELPS TO PREDICT THE PRESENCE OF ANAL HIGH-GRADE SQUAMOUS INTRAEPITHELIAL LESIONS.

P336

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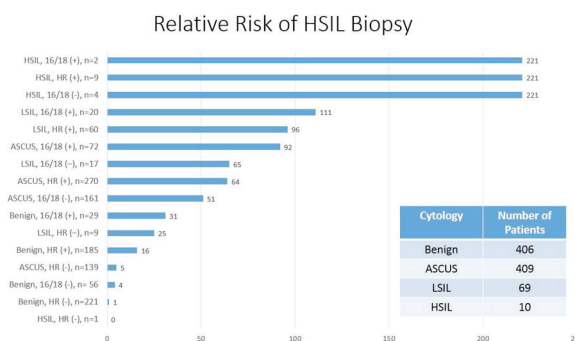
**Purpose/Background:** More than 90% of squamous cell carcinomas of the anus (SCCA) and their precursor lesions, high grade intraepithelial lesions (HSIL), are caused by chronic human papilloma virus (HPV) infections. Abnormal anal cytology and the detection of high-risk HPV are positive predictors for HSIL or SCCA. High-risk (HR) HPV testing is valuable in cervical screening, but use in the anal canal is limited. We hypothesize that testing for anal HPV 16/18 may better predict HSIL.

**Methods/Interventions:** Patients with cytology, HPV testing, and high-resolution anoscopy (HRA) results were included. Either Qiagen Hybrid Capture II DNA Test (HC2) (Hilden, Germany) or Roche Cobas® (Cobas®) HPV assay (Risch-Rotkreuz, Switzerland) were used. Both test for 13 HR types. Cobas® also specifically tests for HPV16/18. We correlated HRA/biopsy results to cytology and HPV results.

**Results/Outcome(s):** 894 patients enrolled (389 HIV-positive, 45 women); median age 46.9 years. Cobas® was used in 608. Statistical analysis was done with a positive biopsy for HSIL as our endpoint. HR HPV testing had significantly higher sensitivity and NPV versus cytology with equivalent specificity and PPV. There was no statistically significant difference between Cobas® and HC2 in their ability to detect HR HPV strains. However, when Cobas® was used to screen for specific strains HPV 16/18, it significantly improved specificity (48% to 70%) and PPV (23% to 34%). There was a decrease in sensitivity (95% to 48%) and NPV (98% to 81%). Among patients with benign cytology, the incidence of HSIL was higher in those who tested positive for HPV 16/18 (14%) than those negative for HPV16/18 but positive for other HR HPV strains (5%) and negative for all HR HPV strains (0.5%). There

was no significant difference in results by HIV status, sex, or prior HSIL diagnosis.

**Conclusions/Discussion:** Compared to cervical cytology, anal cytology is less reliable for dysplasia screening. Although screening guidelines vary, virtually all protocols recommend HRA for abnormal cytology, with interval follow-up for benign cytology. We found that patients with benign cytology and HPV 16 or 18 detected had a higher incidence of HSIL than those with LSIL or ASCUS cytology who were negative for HR HPV. The increased risk of HSIL in patients with benign cytology who test positive HPV 16/18 suggests that these patients should undergo HRA.



Relative risk of HSIL pathology by cytology and HPV testing

### MYOPENIA IS ASSOCIATED WITH REDUCED ACTIVE COMPLIANCE IN AN ENHANCED RECOVERY PROGRAMME IN PATIENTS WITH COLORECTAL CANCER.

P337

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**Purpose/Background:** Poor “active” compliance within an enhanced recovery programme (ERAS) is associated with increased morbidity in the early post-operative period. The aim of the present study was to examine the relationship between myopenia and the compliance rate to the active elements of an ERAS programmed for patients treated surgically for primary operable colorectal cancer (CRC).

**Methods/Interventions:** Data from 614 consecutive patients were included. Image analysis of serial CT scans was used. Cut-offs for low muscularity normalised for stature were based on a CT-based myopenic obesity study of cancer patients. An ERAS element was considered active if the patient would be required to make a direct contribution in order to achieve its compliance. The relationship between myopenia, active compliance and other clinico-pathological parameters was assessed.

**Results/Outcome(s):** Median age was 69 years [IQR, 61-75]. The majority of the study’s population had reduced muscle mass ( $n=383$ , 62.4%). Multivariate analysis

identified age >65 years (OR 3.84, (95% CI 1.88-7.45)  $P < 0.001$ ), stoma formation (OR 2.65 (1.62-4.98)  $P < 0.001$ ), myopenia (OR 6.907 (3.447-13.839)  $P < 0.001$ ) and open surgery (OR 1.812 (1.063-3.091)  $P = 0.029$ ) as an independent prognostic factors for poor active compliance.

**Conclusions/Discussion:** Compliance with active elements of an enhanced recovery programme is more difficult to achieve. This study highlights a direct and independent relationship between myopenia in patients with primary operable colorectal cancer and active compliance. Body composition analysis can be used preoperatively to initiate early identification of the problem and allow a more personalised recovery programme for potentially "poor" performers.

### PROTOCOLIZED CARE FOR PATIENTS UNDERGOING CURATIVE COLORECTAL CANCER SURGERY MAY OPTIMIZE PATIENT BODY COMPOSITION.

P338

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**Purpose/Background:** Evidence indicates that certain Body Composition (BC) profiles are associated with short-term outcomes and disease progression in colorectal cancer (CRC). However, few studies have investigated the factors that influence the optimization of BC, postoperatively. The aim of this study was to determine the factors that optimise the BC as expressed as Skeletal Muscle Index (SMI) in patients with primary operable colorectal cancer.

**Methods/Interventions:** Prospectively collected data from consecutive patients with a diagnosis of non-metastatic CRC undergoing elective surgical resection between 2007 and 2013 were included. Image analysis of CT scans was used to calculate Lumbar skeletal muscle index (SMI). CT scans within 6 months before and 6 months after surgery were included. Patients with preoperative SMI that changed positively postoperatively were considered to have a positive change and optimised SMI. Analysis considered predictive factors of "SMI optimization", including age, sex, BMI, T & N stage, ASA, surgical approach and participation in a protocolised enhanced recovery pathway.

**Results/Outcome(s):** 834 patients (median age of 72 years [IQR, 63-81]) were assessed. 183 patients (22%) of the population had a positive change in their SMI post-operatively. Multivariate regression analysis identified ERAS care (OR 3.76, (95% CI 2.27-10.01)  $P < 0.001$ ) and laparoscopy (OR 2.43 (1.23-4.40)  $P = 0.009$ ) to be independent prognostic factors for "SMI optimization".

**Conclusions/Discussion:** From this cohort study, CRC patients treated within a protocolized enhanced recovery programme are more likely to have an optimised post-operative SMI. This is a novel observation. Considering

patients at highest risk of recurrence, it is feasible that enhanced recovery interventions may positively alter eventual cancer outcomes.

### MEASUREMENT OF LOW ANTERIOR RESECTION SYNDROME: A SYSTEMATIC REVIEW OF THE LITERATURE INCLUDING ASSESSMENT OF INCIDENCE.

P339

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**Purpose/Background:** Background There is increasing awareness of the poor functional outcome many patients suffer after sphincter-preserving rectal resection, termed 'low anterior resection syndrome' (LARS). There is no consensus definition of LARS and lack of standardisation in the measurement of LARS complicates research into incidence, contributing factors, and potential therapies. Aim To identify and assess the incidence of the major themes used in the assessment of LARS.

**Methods/Interventions:** Methods A systematic review of the literature was performed for studies published between 1986 and 2016. The instruments and outcome measures used to report bowel function after low anterior resection were extracted and a thematic analysis was conducted. The incidence of each theme was assessed.

**Results/Outcome(s):** Results The search revealed 128 eligible studies. These employed 18 instruments, over 30 symptoms, and follow-up time periods from 4 weeks to 14.6 years. The most frequently reported outcomes were incontinence, stool frequency, urgency, evacuatory dysfunction (fragmentation and clustering), gas-stool discrimination, and impact on quality of life. Fecal incontinence scoring systems were used frequently, while the two instruments designed specifically to measure LARS - the LARS Score and the Bowel Function Instrument (BFI) - were used in only 9 studies. Studies that reported a LARS Score used heterogeneous follow-up periods and patient populations (e.g. rates of neoadjuvant therapy), which contributed to a large variation in the reported incidence of LARS. Major LARS was reported in 38 - 62%, minor LARS in 22 - 28%, and no LARS in 10 - 38% of patients. There was significant heterogeneity within basic definition and measurement tools used for single symptoms, complicating assessment of their incidence. Symptoms were often combined into a score and follow-up time periods were variable. Overall, clustering and/or fragmentation were reported in over half of all patients. Urgency, lifestyle alteration, and lack of gas-stool discrimination were reported in over a third, and fecal incontinence in over a quarter of patients.

**Conclusions/Discussion:** Conclusion LARS is common, but there is currently excessive variation in the reporting of post-low anterior resection functional outcomes.

Measurement is often based on fecal incontinence scoring systems which may under-estimate the incidence of the problem and neglects symptoms shown to correlate with patient-related quality of life. A consensus definition of LARS should be developed to improve and standardize research, and these findings will inform this goal.

### RIGHT COLON RESECTION FOR COLON CANCER: DOES SURGICAL APPROACH MATTER?

P340

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**Purpose/Background:** Surgical resection with curative intent remains the standard of care for colon cancer. The ideal surgical approach for right-sided colon cancer remains unknown. This study aims to compare the 30-day outcomes and oncologic results following open, laparoscopic, and robotic right colon resection for colon cancer using the Targeted Colectomy American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP).

**Methods/Interventions:** All patients undergoing elective, right colon resection with primary anastomosis were identified within the targeted colectomy ACS-NSQIP database. Only patients with stage I, II, or III colon cancer were included. The association of surgical approach with oncologic outcomes and 30-day morbidity and mortality outcomes was investigated using chi-square analysis for categorical variables and student's t-test for continuous variables. A composite outcome variable which included the incidence of superficial and deep wound infections, organ space infections, wound dehiscence, prolonged intubation, venous thromboembolism, need for postoperative blood transfusion, and unplanned return to the operating room was also compared between the three groups. A p-value < 0.05 was considered statistically significant.

**Results/Outcome(s):** A total of 3,518 patients met inclusion criteria; 1,024 (29.1%) underwent open surgery, 2,405 (63.4%) underwent laparoscopic surgery, and 89 (2.5%) underwent robotic surgery. The median number of lymph nodes harvested did not differ between the groups (18 vs. 19 vs. 18). In terms of 30-day outcomes, patients undergoing open surgery were significantly more likely to experience prolonged intubation (2.2% vs. 1.0% vs. 0, p = 0.02), a deep wound infection (1.5% vs. 0.3% vs. 1.1%, p = 0.001), wound dehiscence (1.1% vs. 0.21% vs. 0%, p = 0.005), deep venous thrombosis (15.2% vs. 7.0% vs. 11.2, p = .04), bleeding requiring a blood transfusion (15.2% vs. 7.0% vs. 11.2%, p < 0.001), a prolonged postoperative ileus (19.3% vs. 9.8% vs. 12.4%, p < 0.001), and had a significantly longer length of hospital stay (7.8 vs. 5.2 vs. 4.4 days, p < 0.001) than either those undergoing

laparoscopic or robotic surgery. Patients undergoing open surgery were significantly more likely to experience the composite outcome than those undergoing laparoscopic surgery (p < 0.0001) while there was no difference between the laparoscopic and robotic groups (p = 0.88). Finally, patients undergoing open surgery were significantly more likely to die within 30 days of their index procedure (1.46% vs. 0.54% vs 1.12%, p = 0.02).

**Conclusions/Discussion:** The laparoscopic and robotic approach to colon resection for right-sided colon cancer has less 30-day morbidity compared to open surgery with an equivalent number of lymph nodes harvested. Based on the results of this study, minimally invasive surgery, whether it is laparoscopic or robotic, should be the standard of care for right-sided colon cancer surgery.

### HYPOALBUMINEMIA IN COLORECTAL CANCER PATIENTS: DOES AGE MATTER?

P341

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**Purpose/Background:** Patients with colon cancer have an impaired nutritional status related to their underlying malignant process. Earlier this year, we demonstrated that patients with a preoperative albumin level less than or equal to 3.1g/dL experience greater postoperative morbidity and mortality following colon resection for curative intent. This conclusion was made for all patients irrespective of age. Nevertheless, recent studies have shown that elderly patients may have a different risk profile than their non-elderly counterparts. The purpose of this study is to determine if there is an association between age and the albumin cut-point for increased morbidity and mortality following colon resection for colon cancer using the Targeted-Colectomy American College of Surgeons National Surgery Quality Improvement Program (ACS-NSQIP).

**Methods/Interventions:** Stage I, II, and III elective colon resections with ileocolostomy or colocolostomy were identified within the ACS-NSQIP targeted colectomy database from 2012 through 2013. Patients were stratified into four quartiles based on their age at the time of surgery. Preoperative hypoalbuminemia was defined as less than or equal to 3.1 g/dL. An albumin-age interaction term was created and a multivariate logistic regression model was used to investigate the association of age and preoperative hypoalbuminemia with 30-day postoperative morbidity and mortality.

**Results/Outcome(s):** A total of 5,143 patients met inclusion criteria; 327 (6.4%) had preoperative hypoalbuminemia. Patients aged 20-58 comprised quartile one, patients aged 59-68 comprised quartile two, patients aged 69-77 comprised quartile three, and patients aged 78-90

comprised quartile four. The association of preoperative hypoalbuminemia with postoperative morbidity and mortality was statistically significant for all age quartiles ( $p = 0.021$ ) while the association of age ( $p = 0.93$ ) and the age-albumin interaction ( $p = 0.73$ ) with postoperative morbidity and mortality was not statistically significant.

**Conclusions/Discussion:** The albumin level at which point early patient morbidity and mortality following elective colon resection with primary anastomosis for colon cancer does not differ by age. Therefore, any patient with a preoperative albumin level less than or equal to 3.1 g/dL being evaluated for colon cancer requires further evaluation and preoperative optimization prior to surgical intervention.

#### PERINEAL RECONSTRUCTION AND SURGICAL COMPLICATION DELAY ADJUVANT CHEMOTHERAPY AFTER SURGERY FOR RECTAL CANCER BUT DO NOT IMPACT UPON SURVIVAL.

P342

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**Purpose/Background:** Adjuvant chemotherapy is recommended for locally advanced colorectal cancer (CRC). Guidelines recommend adjuvant chemotherapy for patients with high-risk stage II and all stage III rectal cancer. Whenever possible it is recommended that adjuvant chemotherapy should begin within 6 weeks of surgery. Delay in starting chemotherapy has been shown to reduce overall survival (OS) and disease-free survival (DFS). The purpose of this study was to investigate the causes for delaying adjuvant chemotherapy in rectal cancer and to study any effect of OS & DFS

**Methods/Interventions:** All patients undergoing surgery for primary rectal cancer were identified from a prospectively maintained database in our institution between March 2009 and October 2013 were initially included. Patients were subsequently excluded if the first post-operative MDT decision did not indicate adjuvant chemotherapy. Data was gathered on patient and cancer characteristics as well as the date of the first postoperative MDT and date of commencement of adjuvant chemotherapy. Delay in commencing therapy was defined as greater or equal to 8 weeks post surgery. Data were ordered by log rank test, and analysed with SPSS software (IBM, USA).

**Results/Outcome(s):** 201 patients underwent surgery for rectal cancer in the 44 months between March 2009 and October 2013, of which 89 patients (44.3%) proceeded to have adjuvant chemotherapy. Univariate and multivariate analysis of risk factors for delay in commencing adjuvant chemotherapy demonstrated that,

based upon a Cox Proportional Hazards model, perineal reconstruction ( $p=0.06$ ), increased length of inpatient stay ( $p=0.031$ ), and Clavien Dindo Classification score of postoperative complications ( $p=0.031$ ) all independently predicted a delayed start to the start to chemotherapy of greater than 8 weeks. Waiting longer than 8 weeks for adjuvant chemotherapy, however, had no impact on OS ( $p=0.463$ ) or DFS ( $p=0.893$ ).

**Conclusions/Discussion:** Delay in commencing adjuvant chemotherapy is thought to be an adverse factor in OS and DFS. Identification of the risk factors for delays in starting adjuvant chemotherapy will allow health professionals to try and target care improvements to reduce the delay associated with the identified risk factors. This study has demonstrated that increased length of hospital stay, perineal reconstruction, and Clavien Dindo score, were associated with a delay in commencing adjuvant chemotherapy post rectal cancer surgery. The delay in therapy was not however accompanied by a demonstrable change in overall or disease-free survival. Further, large studies are needed to identify the role of adjuvant chemotherapy in Stage II/III rectal cancer, whether there is evidence for an 8-week time period, and to identify any reversible risk factors that could impact on patient outcomes.

#### DNA METHYLATION IN RECTAL CANCER: CLINICAL IMPLICATIONS.

P343

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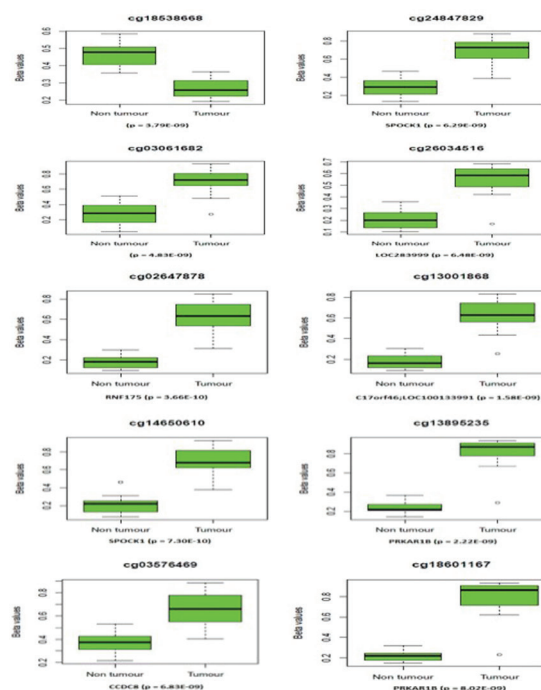
**Purpose/Background:** Rectal cancer differs from colon cancer in terms of its underlying biological behaviour, clinical course, genetic and epigenetic aetiology. Epigenetic mechanisms modify gene expression independently of DNA sequence. DNA methylation is the most studied epigenetic mechanism, known to play a role in colorectal cancer. However, the role of DNA methylation specific to rectal cancer is poorly understood. Here we present the results from a DNA methylation study of 45 individuals with rectal cancer.

**Methods/Interventions: Sample Collection:** A total of 45 patients (>18 years) diagnosed with rectal adenocarcinoma (Stage II & III) who underwent or were undergoing treatment were recruited. Matched rectal tumour and adjacent normal mucosal samples ( $n=90$ ) were obtained from each patient and flash frozen. Some samples were subsequently processed fresh frozen ( $n=32$ ), others were paraffin embedded ( $n=58$ ). **DNA Methylation Profiling:** DNA was extracted and checked for quality and quantity, treated with sodium bisulfite and run on the Illumina Infinium HumanMethylation 450 Beadchip. **Quality Control (QC) & Statistical Analysis:** Data was checked for low signal intensities, incomplete bisulfite conversion and gender mismatches. Only samples that passed the QC

were subsequently analysed (n=30). A linear regression model was performed to identify differentially methylated probes (DMPs) and genomic differentially methylated regions (DMRs) associated with rectal cancer. Data was analysed using Student's t-test for group mean differences in DNA methylation between the normal and tumour samples ( $P < 1E-07$ ).

**Results/Outcome(s):** A combined linear regression analysis of all 408,652 probes showed that **global levels of DNA methylation are decreased in rectal cancer** samples compared with normal unaffected samples. **176 probes** were differentially methylated between rectal cancer tissues and normal mucosa. The beta value difference of the top 10 autosomal DMPs (ranked by P value) are shown in Figure 1. The **majority of DMPs (79%)** were located in **CpG islands** associated with gene promoters and improper silencing of regulatory genes in cancer. Region level analysis was performed using Comb-p to identify spatially correlated regions of differential DNA significantly associated with rectal cancer ( $P < 1E-7$ , number of probes  $>=5$ ). In total, **828 DMRs** were identified in rectal cancer vs normal tissue.

**Conclusions/Discussion:** We identified several DMPs and DMRs associated with rectal cancer. DNA methylation changes have previously been associated with differences in response to therapy and treatment outcomes in colorectal cancer. To our knowledge, this is the first study to address genome wide methylation changes using novel bioinformatics approaches in rectal cancer patients. These findings improve our understanding of the epigenetics of this disease. Furthermore, they have the potential to be used as biomarkers for detection, prognosis and monitoring treatment response in patients with rectal cancer.



**Fig 1. Box plots of beta values of the top 10 probes, showing the beta values of tumour vs non tumour samples, with the probe name on top of plot, gene name and p values at the bottom. Nine out of the ten top-ranked DMPs show increase in methylation in tumour samples vs normal mucosa. One probe (cg18538668) shows hypomethylation of tumour sample compared to normal mucosa.**

## EFFECTIVENESS OF A LYNCH SYNDROME SCREENING PROGRAM IN LINKING AT-RISK PATIENTS TO GENETIC COUNSELING.

P344

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**Purpose/Background:** Lynch Syndrome (LS) is an autosomal dominant condition that increases one's risk of developing colorectal, endometrial, and other extracolonic cancers. Our center implemented a reflex screening protocol for DNA mismatch repair (MMR) deficiency in March 2014. Patients with MMR deficient (dMMR) cancers suspicious for LS were referred for genetic counseling (GC). Our goal was to determine the compliance rate with GC and factors associated with successful follow up.

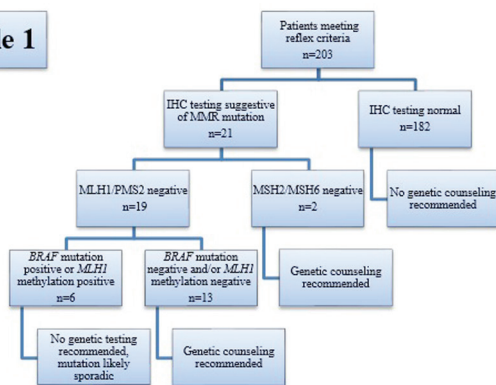
**Methods/Interventions:** Immunohistochemistry (IHC) for the MMR proteins MSH2, MLH1, MSH6, and PMS2 was performed on all colorectal tumor resections from patients  $\leq 70$  years of age, and all stage II cancers according to NCCN guidelines and per special request for other reasons. Tumors with loss of MLH1/PMS2 were tested for BRAF mutation or MLH1 promoter methylation to identify epigenetic inactivation of MLH1. Patients with loss of MLH1/PMS2 without BRAF mutations or with absence of

MLH1 methylation and those with loss of MSH2/MSH6 were referred to GC. Compliance with GC was assessed.

**Results/Outcome(s):** 203 tumors were tested by IHC. 21 (10.3%) tumors had abnormal MMR protein expression: 2 patients had loss of MSH2/MSH6. 19 patients had loss of MLH1 and/or PMS2. 6 of those were subsequently found to have BRAF mutations or were MLH1 methylation positive and therefore considered sporadic. 11 patients were BRAF mutation negative and/or MLH1 methylation negative. 1 patient was referred to GC directly because there was insufficient tumor left for further testing. 1 patient had loss of PMS2 only. (Table 1) Excluding 1 patient who expired, 14 patients were referred for GC. 5 of these patients saw a counselor, and underwent germline testing for MMR gene mutations or larger cancer predisposition gene panels. 2 patients decided not to be tested, despite knowing that they had a family history significant for LS associated-neoplasms. The other 7 patients did not respond after multiple attempts to schedule an appointment. Of the 7 patients who did comply (or respond), 6 had a family history concerning for LS. Of the 7 patients who did not comply, only 1 had a concerning family history. Of the 5 patient who underwent genetic testing, 1 patient had confirmation of a known MSH2 germline mutation and 4 patients were mutation negative.

**Conclusions/Discussion:** Achieving satisfactory compliance with GC appears to be a challenge. Interestingly, those with a strong family history of LS-associated neoplasms were more likely to pursue GC or refuse GC. Even though no new germline mutations were identified in our cohort, the family members of several patients suspicious for a cancer predisposition syndrome are now following more aggressive colon cancer screening regimens. Deficits in compliance, particularly in the group of patients without a concerning family history, provide an opportunity to improve patient care through enhanced education on hereditary colorectal cancer syndromes.

**Table 1**



**SUSTAINABILITY OF QUALITY IMPROVEMENT INITIATIVES IN RECTAL CANCER: EVALUATION USING THE NHS MODEL.**

P345

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**Purpose/Background:** Quality improvement initiatives in the area of oncology have been a major focus of provincial healthcare and cancer agencies in Canada. Sustainability of initiatives after they have been implemented is not well described in existing literature despite an increased interest by funders and key stakeholders on the sustainability of initiatives after initial funding ends. The aim was to increase understanding of the issue at hand by using the UK National Health System (NHS) model to assess sustainability of the quality initiatives endorsed and implemented by the Canadian Partnership Against Cancer (CPAC) study in rectal cancer.

**Methods/Interventions:** The NHS tool was distributed to 32 physicians at 8 Canadian cancer centres. An online survey distribution service was used and participating physicians were sent a reminder after 2 weeks. The quantitative data was interpreted using the NHS master score system. A final score of 55 or higher offers reason for optimism and a score of 45 or lower suggests the need to take action to increase the likelihood that the improvement initiative will be sustained.

**Results/Outcome(s):** The mean scores for synoptic operative report, MRI synoptic report, Quirke pathology method, radiation oncology peer review, and presentation at multidisciplinary cancer conference were 53.03 (IQR 19.05), 80.99 (IQR 41), 84.94 (IQR 14.95), 89.5 (IQR 7.6), and 70.78 (IQR 36.05) respectively. By center, the lowest score was 58.14 (IQR 40.4) and the highest was 91.26 (IQR 5.8). There was significant deviation (p < 0.05) from the expected value in the Quirke method and radiation oncology peer review both scoring above expected

**Conclusions/Discussion:** The NHS scores indicated a positive attitude towards sustainability across the majority of quality initiatives and across the 8 cancer centres. The positive outliers included initiatives that had already been implemented at centres prior to onset of the study as well as centers where the clinicians had been actively engaged in successful integration of the quality initiatives. The variation in scores across centres and initiatives, however, identifies the need for further investigation to identify sites at risk of long term failure and strategies that positive outliers are using to achieve high attitudes towards sustainability of quality initiatives.



## THE INCIDENCE OF INCISIONAL HERNIAS FOLLOWING ILEOSTOMY REVERSAL IN COLORECTAL CANCER PATIENTS TREATED WITH ANTERIOR RESECTION.

P346

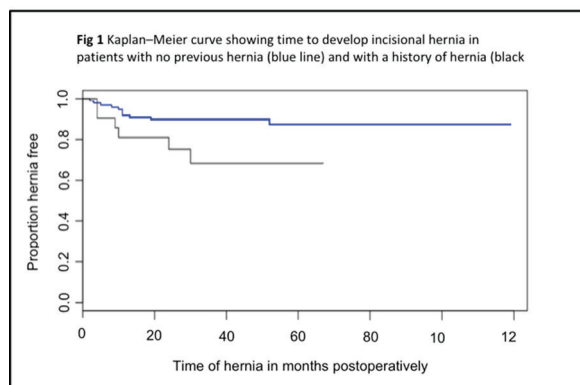
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**Purpose/Background:** The aim was to identify the rate of incisional hernia formation following ileostomy reversal in patients who underwent anterior resection for colorectal cancer. In addition, we aimed to ascertain risk factors for the development of reversal-site incisional hernias and to record the characteristics of the resultant hernias.

**Methods/Interventions:** Using a prospectively compiled database of colorectal cancer patients who had undergone anterior resection, we identified individuals who had undergone both ileostomy formation and subsequent reversal of their ileostomies from January 2005 - December 2014. Medical records were reviewed to record descriptive patient data about risk factors for hernia formation, operative details and any subsequent operations. Computed tomography (CT) scan reports were then reviewed in order to identify the number, site and characteristics of incisional hernias.

**Results/Outcome(s):** A total of 121 patients were included in this study; 14.9% (n=18) developed an incisional hernia at the ileostomy reversal site; 17.4% (n=21) at a non-ileostomy site and 6.6% (n=8) developed both. The reversal site hernias were smaller both in width and length compared to the non-ileostomy site hernias. Risk factors for the development of reversal-site incisional hernias were higher BMI, lower age, open surgery, longer ileostomy reversal time and a history of previous hernias. We did not detect a difference in the size of the incisional hernias that developed in patients with these specific risk factors.

**Conclusions/Discussion:** Incisional hernias are a significant complication of ileostomy reversal. Further evaluation of the use of prophylactic mesh to reduce the incidence of incisional hernias may be worthwhile.



## PERIOPERATIVE NUTRITIONAL SCREENING AND PREHABILITATION FOR PATIENTS UNDERGOING SURGERY FOR COLORECTAL CANCER AND THE EFFECT ON HEALTH AND WELLBEING OUTCOMES: A PROTOCOL FOR A SYSTEMATIC REVIEW OF QUANTITATIVE EVIDENCE.

P347

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**Purpose/Background:** The prevalence of concomitant malnutrition in patients with cancer is varied but estimated to be 30-60% in those with colorectal cancers. Post-operative complications are more common and more severe among patients suffering malnutrition. Peri-operative nutritional intervention may improve prognosis and outcomes, through the halting, and in some cases reversal, of nutritional decline. The purpose of this study is to create a systematic review protocol to identify the effect of nutritional screening and intervention on post-operative outcomes in patients undergoing elective colorectal cancer surgery.

**Methods/Interventions:** A comprehensive search, and subsequent screening, was undertaken to identify all relevant research regarding nutritional screening and intervention in patients with colorectal cancers undergoing operative management. Included papers were appraised using standardised critical appraisal instruments from the Joanna Briggs Institute. Relevant data will be extracted and synthesised using meta-analysis or narrative synthesis.

**Results/Outcome(s):** Results regarding the impact of nutritional screening and intervention on post-operative outcomes including length of stay, mortality, and post-operative complications. The existing body of literature may show that the use of validated nutritional screening tools and subsequent intervention may improve post-surgical outcomes in patients undergoing surgery for colorectal cancer.

**Conclusions/Discussion:** The results of this review will be used to suggest a cost-effective, efficient, and acceptable form of peri-operative optimisation of patients with colorectal cancer. This can help produce a more positive patient experience while reducing length of stay, decreasing complication rates, and improving strength and nutrition.

## IS LAPAROSCOPIC RESECTION A TRUE CONTRAINDICATION FOR T4 COLON CANCER?

P348

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**Purpose/Background:** A laparoscopic approach for colon cancer has become widely accepted, with improved perioperative outcomes compared to open surgery. However, its safety for T4 tumors remains controversial. We hypothesize that laparoscopy can be safely used for T4a tumors, but not T4b tumors, where local invasion occurs to adjacent structures. The aim of this study was to compare short-term and long-term outcomes in patients undergoing laparoscopic vs. open resection for T4 colon cancer.

**Methods/Interventions:** A single-institution prospectively-maintained database was queried to identify patients with pathological T4 colon adenocarcinoma, electively operated on with curative intent between 2000 and 2010. Exclusion criteria were metastatic disease, emergency surgery, inflammatory bowel disease, and hereditary colorectal neoplasm. Patients were divided into 2 groups based on use of laparoscopy. Patient characteristics, perioperative and oncologic outcomes were compared using univariate and Kaplan-Meier survival analyses.

**Results/Outcome(s):** 119 patients met the inclusion criteria, 41 laparoscopic surgeries (L), and 78 open surgeries (O). No difference was observed in age, gender, BMI, ASA, and procedure between groups (table). There were more pT4b tumors surgically treated by open approach (30 vs 7 patients), and tumors treated by L were smaller than O (5.0 vs. 6.9 cm,  $p=0.003$ ). No difference was

**P348 Characteristics, short-term and long-term outcomes by laparoscopic or open surgery**

	Laparoscopy (n=41)	Open (n=78)	p value
Age (mean/SD)	69.6 (14.3)	68.2 (15.8)	0.904
Male Gender	22 (54%)	49 (63%)	0.333
BMI (mean/SD)	29.0 (7.6)	26.5 (5.2)	0.164
ASA 1 – 2	10 (24%)	22 (28%)	0.656
ASA 3 – 4	31 (76%)	56 (72%)	0.656
Procedure			0.393
Left Colectomy	11 (27%)	26 (33%)	
Right Hemicolectomy	29 (71%)	45 (58%)	
Total Abdominal Colectomy	1 (2%)	5 (6%)	
Transverse Colectomy	-	2 (3%)	
Pathological Stage			0.436
II	19 (46%)	42 (54%)	
III	22 (54%)	36 (46%)	
Pathological T Stage			0.017
T4a	34 (83%)	48 (62%)	
T4b	7 (17%)	30 (39%)	
Pathological Tumor Size (mean/SD)	5.0 (2.6)	6.9 (4.7)	0.003
Conversion	9 (22%)	-	N/A
Conversion for T4a tumors	4 (12%)	-	N/A
Conversion for T4b tumors	5 (71%)	-	N/A
Postoperative complications	13 (32%)	28 (36%)	1.000
Reoperation	1 (2%)	4 (5%)	0.648
Readmission	5 (12%)	6 (8%)	0.658
Mortality	-	1 (1%)	0.420
Length of Stay - days (median, IQR)	6 (4 – 10)	9 (6 – 12)	0.005
5-yr overall survival (%)	78%	86%	0.872
5-yr disease-free survival (%)	52%	48%	0.372
5-yr cancer-specific survival (%)	61%	76%	0.161
5-yr overall recurrence (%)	8%	21%	0.134

Data in number / percentage, otherwise specified

BMI - Body Mass Index

ASA - American Society of Anesthesiologists Classification

observed in morbidity, mortality, reoperation, or readmission between groups, although length of hospital stay was shorter in L compared to O ( $p=0.005$ ). Of 41 patients in L group, 5 were treated by hand-assisted laparoscopy, and 5 by single-port approach. 37 patients had pathological T4b tumors. In L, the organs involved were ileum (3), duodenum (2), stomach (1), and omentum (1). In O, the organs involved were bladder (12), stomach (6), ileum (3), colon (2), psoas muscle (2), duodenum (1), pancreas (1), spleen (1), abdominal wall (1), and omentum (1). For pT4b tumors, R0 resection rate was 94% (86% in L vs. 97% in O,  $p=0.249$ ). Conversion was necessary in 22% of the cases. However, when tumors were subdivided by pT4 classification, conversion was necessary in 4 out of 34 patients (12%) with pT4a tumors, and in 5 out of 7 (71%) patients with pT4b tumors. The use of laparoscopy did not impact overall survival, disease-free survival, cancer-specific survival, or overall tumor recurrence.

**Conclusions/Discussion:** Laparoscopic surgery can be safely performed in pT4 colon cancer, with similar oncologic outcomes as in open surgery. However, for pT4b tumors, the conversion rate is very high, and open approach may be preferable.

**ANAL DYSPLASIA SCREENING IN TRANSPLANT PATIENTS: NON-RANDOMIZED PROSPECTIVE STUDY THAER OBAID MD, LAWRENCE CETRULO MD, RICHARD GREENBERG MD FACS EINSTEIN HEALTHCARE NETWORK, PHILADELPHIA, PENNSYLVANIA.**

P349

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**Purpose/Background:** The oncogenic strains of human papillomavirus (HPV) infection is well known to cause anogenital cancer. 60% of sexually active adults have antibodies to genital HPV, suggesting prior infection. Retrospective studies have established the direct link of HPV infection and anal dysplasia in HIV positive population. A cohort study showed that as many as 49% of HIV-infected homosexual developed high-grade dysplasia in the course of a 4-year period compared with 17% of HIV-uninfected homosexual men. Immunosuppression seems to play an important role in the development of anal dysplasia beyond the usual risk factors of HPV infection. Small retrospective studies documented that HPV related anal cancer rates increased in kidney and liver transplant patients. It is well established that HIV patients have an increased incidence of progressing from low grade to high grade anal dysplasia and carcinoma in situ compared to the general population. We focused our evaluation on immunosuppressed solid organ transplant recipients to discover if transplant patients are in fact at increased risk of anal dysplasia.

**Methods/Interventions:** An average of 160 solid organ transplants performed annually at Einstein medical center in Philadelphia. In this study, an IRB was obtained from the Einstein grant society for a prospective analysis of 50 solid organ transplants. Patients were recruited and consented to undergo screening for anal dysplasia using Papanicolaou (PAP) smear during their follow up transplant office visit. Exclusion criteria included Failed previous transplant, HIV positive patients and patients with history of anal cancer. All PAP smears were collected by a certified nurse and tests were sent out to QUEST laboratories for analysis.

**Results/Outcome(s):** 39 kidney transplant, 9 liver transplant and 2 liver-kidney transplant patients were evaluated between the year 2015 and 2016. All patients immunosuppressed with Prednisone, Mycophenolate Mofetil and Tacrolimus and were monitored closely by our transplant team. Out of the 50 patients we identified 3 patients (6%) with atypical squamous cells on pap smear.

**Conclusions/Discussion:** Our study evaluated the higher risk of anal squamous cell dysplasia in transplant patients compared to the national low risk group. Screening for anal HPV and dysplasia with pap smear in transplant patients seems to be a feasible measure for early diagnosis and treatment of HPV related anal cancer. Although some studies have suggested that frequent anal cytology may be a cost-effective method to prevent anal cancer in high risk patients, further randomized or cohort studies is needed to demonstrate improved survival or outcomes in transplant patient.

**ROBOTIC SURGERY FOR RECTAL CANCER: AN EXPERIENCE FROM A SINGLE INSTITUTION.**

P350

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**Purpose/Background:** Laparoscopic rectal resection is a technically challenging procedure with important drawbacks and robotic surgery may help to overcome some of the limitations of laparoscopy. The aim of this study was to present a single institution's experience with robotic surgery in rectal cancer.

**Methods/Interventions:** A retrospective review of a prospectively maintained database of consecutive patients undergoing robotic surgery for stage I-III rectal cancer between December 2014 and October 2016 was performed. All the operations were performed with the da Vinci Xi<sup>®</sup> robot. Data on demographics, tumor characteristics, post-operative 30-day complications and oncologic outcomes were analyzed.

**Results/Outcome(s):** There were 94 patients (54 males, 57%) with a mean age of  $58.9 \pm 11.3$  years (range, 32-87 years) and a mean body mass index of  $29.6 \pm 5.0$  kg/m<sup>2</sup>. Low/very low anterior and abdominoperineal resection

were performed in 86 and 8 patients, respectively. There were two intraoperative complications (2%); an aortic injury and a urethra laceration. There were three conversions to open surgery (3.2%). The mean overall operative time and blood loss were  $318.2 \pm 108.7$  min and  $127,8 \pm 165.6$  ml, respectively. The mesorectal fascia was complete or near-complete in 92 patients (98%). Histopathologic examination revealed surgical margin positivity in one (1%) specimen. The mean number of lymph nodes retrieved was  $25 \pm 12$  (range, 3-62). The mean time to flatus, bowel movement, and oral intake was  $2.1 \pm 0.8$ ,  $2.9 \pm 1.6$ , and  $2.9 \pm 1.6$  days, respectively. The mean hospital stay was  $6.3 \pm 3.1$  days. Postoperative complications occurred in 17 patients (18%), including anastomotic leak in 3, abdominal/pelvic abscess in 3, wound infection in 5, ileus in 7, and pulmonary emboli in 1 patient. Disease recurrence has been identified in one patient during a mean follow-up period of  $13.2 \pm 7.0$  months.

**Conclusions/Discussion:** Robotic rectal resection is a safe and feasible technique, and seems to provide acceptable oncologic and short-term clinical outcomes. The greater maneuverability of the da Vinci Xi<sup>®</sup> system allows for both abdominal and pelvic parts of the procedure in terms of mobilization of the left colon and resection of the rectum.

#### PREDICTORS OF RECTAL ADENOMA RECURRENCE FOLLOWING TRANSANAL ENDOSCOPIC MICROSURGERY.

P351

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**Purpose/Background:** Rectal adenomas are premalignant lesions, with an approximately 2.5% annual rate of transformation to adenocarcinoma. Transanal endoscopic microsurgery (TEM) has become the treatment of choice in patients with rectal adenoma. However, adenoma recurrence is not well defined. The purpose of this study was to determine the recurrence rate and time to recurrence of rectal adenomas removed by TEM technique. Further, we endeavored to identify risk factors for rectal adenoma recurrence.

**Methods/Interventions:** Retrospective analysis of a prospectively maintained database including demographic, operative, pathologic and follow up information for all patients undergoing TEM at an academic colorectal referral center. For this study, we included patients who had pathology confirmed rectal adenomas undergoing primary excision via TEM. Patients were followed with endoscopic evaluation of the surgical site within 6 months of surgery and colonoscopy at 1 year after procedure. Thereafter, patients were followed with conventional endoscopic follow up as per local guidelines. Recurrence was defined as biopsy-proven adenoma growing at the site

of the previous surgical scar on surveillance endoscopy. Multivariate logistic regression was performed on adenoma height, size, position, pathologic margins, and open vs. sutured management of the rectal defect to identify risk factors for recurrence.

**Results/Outcome(s):** Between May 1, 2007 and August 31, 2016, 334 patients underwent TEM for rectal adenoma. The mean age was 67 years and 59.6% of patients were male. Endoscopic follow up at 6 months has been completed in 67.3% of patients. Median follow up was 422 days. Median time to recurrence was 498 days, with 80% of recurrences occurring within 2.2 years. On multivariate logistic regression, unsutured management of the rectal defect (OR 2.6, 95%CI 1.1, 6.3), and positive pathologic margins (OR 3.2, 95%CI 1.1, 9.6) were associated with increased recurrence. Pathologic margin positivity occurred in 7.8% of cases. Two-year overall recurrence rate was 15.4%, but significantly higher in the setting of positive pathologic margins (37.5 vs. 12.9%,  $p=0.01$ ).

**Conclusions/Discussion:** Rectal adenomas excised via TEM have a high recurrence rate, likely related to large tumor size and complexity. Wide surgical margins and diligence in closing the surgical defect may reduce recurrence rates. Regular endoscopic surveillance is recommended, especially in the setting of positive margins.

#### GLOBAL DISPARITIES IN PREOPERATIVE STAGING OF COLORECTAL CANCER.

P352

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**Purpose/Background:** Colorectal cancer is the fourth most common cancer in men and the third most common cancer in women worldwide. There is significant variation in how colorectal cancer is staged preoperatively among different countries. The aim of this study was to describe and compare the differences in preoperative management of colorectal cancer patients in five countries.

**Methods/Interventions:** Institutional data was gathered by chart review from five separate teaching institutions: the Brigham and Women's Hospital in Boston, Massachusetts, Seoul National University Hospital in Seoul, South Korea, Ivano-Frankivsk Regional Cancer Hospital in Ivano-Frankivsk, Ukraine, Maria Sklodowska-Curie Institute of Oncology in Krakow, Poland, and University of Palermo Hospital in Palermo, Italy. A retrospective review was performed of all patients ( $n=2,021$ ) who underwent resection for colorectal cancer in the five hospitals from 2011-2015. Demographic, tumor and preoperative treatment characteristics were compared utilizing paired T-test where appropriate.

**Results/Outcome(s):** Preoperative staging was most extensive in the United States (US). Patients in the US

(97.4%) were more likely to receive CT scans of the abdomen and pelvis (CT A/P) than those in Poland (80.2%,  $p<0.01$ ) and in Ukraine (11.8%,  $p<0.01$ ). Korea and Italy had similar rates of preoperative CT A/P at 95.2% and 96.8% respectively. Patients were more likely to receive CT scans of the chest in the US (67%) than in Poland (2.3%,  $P<0.01$ ), Ukraine (1.7%,  $p<0.01$ ), and Korea (44%,  $p<0.01$ ). CXRs were used much more frequently in the Eastern European countries. Patients in the US were more likely to undergo complete preoperative colonoscopies at 84.5% than those in Italy (68.5%,  $p<0.01$ ), Poland (43.9%,  $p<0.01$ ), and Ukraine (4%,  $p<0.01$ ). Patients in South Korea (46.5%,  $p<0.01$ ), Italy (77.3%,  $p<0.01$ ), and Ukraine (91%,  $p<0.01$ ) were less likely to receive bowel preparation compared to those in the US (100%) and Poland (100%).

**Conclusions/Discussion:** There are widespread differences with respect to preoperative staging of colorectal cancer with significant disparities in the Eastern European countries.

#### ASSOCIATION OF HISTOLOGY AND RESPONSE TO NEOADJUVANT CHEMORADIATION IN PATIENTS WITH RECTAL CARCINOMA.

P353

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**Purpose/Background:** Neoadjuvant chemoradiation (NCRT) followed by radical resection has been used as standard therapy for the management of patients with non-metastasis rectal carcinoma. There is scant data on the association of histology and response to NCRT. The aims of this study were to analyze the response of different

histology to NCRT and assess the risk and factors associated with response in patients approached with NCRT.

**Methods/Interventions:** Patients with rectal carcinoma undergoing NCRT followed by radical resection were identified from an electronic health record system at the Sixth Affiliated Hospital of Sun Yat-sen University between 2007 and 2016. TN response was defined as downstaging of either T or N stage and no progression of T or N after NCRT. T test, *chi-square* analyses, Kaplan-Meier analyses and multivariate logistic regression analyses were performed using the data retrospectively collected.

**Results/Outcome(s):** Two hundred and forty-one patients (27% females, mean age 54) underwent NCRT followed radical resection were classified as poorly differentiated carcinoma (PDC,  $n=23$ , 9.5%), moderately differentiated carcinoma (MDC,  $n=126$ , 52.3%) and highly differentiated carcinoma (HDC,  $n=92$ , 38.2%) according to postoperative histology. Median follow-up time for survival was 23 months. Those patients with poorer differentiated were much younger ( $45.91\pm 1.852$  vs.  $53.31\pm 1.021$  vs.  $56.64\pm 1.077$ ,  $p<0.001$ ). Fourteen (60.9%) patients with PDC achieved TN response compared with one hundred and five (83.3%) with MDC and seventy-four (80.4%) patients with HDC ( $p=0.046$ ). The gender, interval between NACRT and surgery, WBC, serum total protein, serum albumin, CEA and tumor location were not found to be associated with the risk of TN response. Multivariate logistic regression analyses showed that PDC was significantly associated with TN response (MDC vs. PDC,  $OR=0.199$ ,  $p=0.004$ ; HDC vs. PDC,  $OR=0.250$ ,  $p=0.014$ ) after adjusting for age, gender, T and N stage before NACRT, BMI and hemoglobin. (Table III) However, there was no difference in the post-operative complications ( $p=0.272$ ), distant metastasis

**P353 Table: Risk factors related to TN response in patients with rectal cancer: multivariate logistic regression analysis (Forward: conditional).**

Parameters	Partial regression coefficient	Standard error	Wald $\chi^2$	95% CI	p Value
Gender (X1)					2.680
T stage before NACRT (X2)					0.211
N stage before NACRT (X3)	-1.903	0.431	19.468	0.149 (0.064- 0.347)	<0.001
N1 versus N0					
N stage before NACRT (X3)	-2.679	0.505	28.148	0.069 (0.026- 0.185)	<0.001
N2 versus N0					
Differentiated stage (X4)	-1.617	0.558	8.393	0.199 (0.067- 0.593)	<0.001
MD versus PD					
Differentiated stage (X4) HD versus PD	-1.386	0.558	6.306	0.250 (0.083- 0.756)	0.014
Hemoglobin (g/l) (X5)	0.884	0.403	4.809	2.419 (1.098- 5.329)	0.028
BMI (X6)					0.084
Age (X7)					0.585
Constant	0.986	0.403	2.399	2.680	0.121

TN response: No=1; Yes=0. PD: poorly differentiated; MD: moderately differentiated; HD: highly differentiated.

( $p=0.699$ ) and long-term survival ( $p=0.611$ ) between groups.

**Conclusions/Discussion:** Poor differentiation was associated with worse response to NCRT as compared to MDC and HDC in patients with rectal carcinoma while no difference was found in postoperative complications, distant metastasis and long-term survival. NCRT in patients with rectal carcinoma should be reconsidered.

### EFFECT OF A STANDARDIZED POSTOPERATIVE SUSPECTED BLEEDING PROTOCOL ON BLOOD PRODUCT UTILIZATION AND OUTCOMES AFTER ELECTIVE COLORECTAL SURGERY.

P354

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**Purpose/Background:** Large variation in the use of perioperative blood transfusion exists in the field of colorectal surgery, despite the association of blood transfusion with increased postoperative complications and potentially worse oncologic outcomes. In 2013, a postoperative suspected bleeding algorithm was implemented to standardize the approach for assessing suspected bleeding and to reduce blood product use.

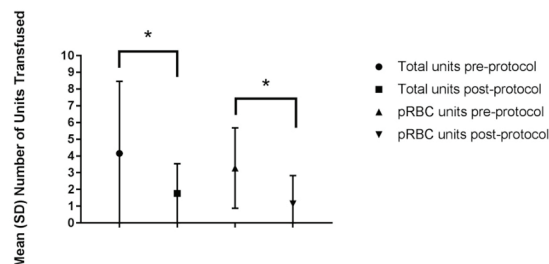
**Methods/Interventions:** A single institution retrospective review was conducted of all patients undergoing an elective colorectal procedure who received a postoperative blood product transfusion or activated the postoperative suspected bleeding protocol between April 2010 and July 2016. Patients were divided into pre and post-protocol implementation groups. Baseline demographics, procedure types, estimated blood loss, number and type of blood product administered, duration of stay, complication type and Clavien-Dindo classification, and thirty day mortality were recorded. Summary, univariate, and multivariable statistical analyses were performed.

**Results/Outcome(s):** A total of 205 patients were found to have received postoperative blood product administration or have activated the postoperative suspected bleeding protocol. 158 (77%) received a blood product transfusion and 43 (27%) did not. Fifty-five percent were women with a mean ( $\pm$ SD) age of 56.5 ( $\pm$ 17.5) years. Patients in pre and post-protocol groups were all similar in age, comorbidities, operating room duration, estimated blood loss, and length of stay ( $p > 0.05$ ). Post-operative hemoglobin nadir was similar in the two groups (7.6 versus 7.8 mg/dL,  $p = 0.11$ ). Pre versus post protocol analysis demonstrated a reduction in the mean ( $\pm$ SD) total number of blood product administered ( $4.16 \pm 4.30$  versus  $1.97 \pm 3.24$ ,  $p < 0.0001$ ) and units of packed red blood cells (pRBCs) transfused ( $3.28 \pm 2.40$  versus  $1.14 \pm 1.69$ ,  $p < 0.0001$ ). Mean amount of fresh frozen plasma

administered was similar between pre and post protocol implementation ( $0.57 \pm 1.50$  versus  $0.79 \pm 1.30$ ).

**Conclusions/Discussion:** Variation in the administration of post-operative blood products in elective colorectal surgery continues to exist. Implementation of our algorithm utilizing clinical and laboratory data has led to a reduction in the total amount of blood product administered and a reduction in the transfusion of pRBCs at our institution. Further study and refinement of our protocol is warranted.

#### Transfusion Algorithm Reduces Blood Product Utilization



### HOW ACCURATE IS MRI AT PREDICTING EARLY RECTAL CANCERS THAT CAN BE TREATED WITH UPFRONT SURGERY?

P355

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**Purpose/Background:** Standard treatment for patients with pre-operative clinical stage II and III rectal cancers is neoadjuvant therapy, while those with clinical stage I disease undergo upfront surgery. Pelvic MRI is most commonly used to assess clinical stage, but there are limitations to current imaging modalities. This study assessed the degree to which MRI correctly predicted early (clinical stage I) disease.

**Methods/Interventions:** Consecutive patients (N = 83) with MRI-staged, clinical T1-2N0M0 rectal cancer who had upfront surgery at a single institution from 2005-2015 were retrospectively reviewed. Clinical (age, sex, BMI, tumour distance from anal verge), MRI (scanner generation, academic/community-based centers, rectal tortuosity, axial angulation, motion artifact), and radiologist (GI subspecialization) characteristics were tested for associations with probability of MRI predicting early disease (true positives). Two experienced GI radiologists who were blinded to final pathology results reviewed all MRI scans to assess rectal tortuosity, axial angulation, and motion artifact, which are novel metrics that have not been previously described for rectal cancer MRI interpretation.

**Results/Outcome(s):** 41/83 patients had early (less than or equal to pT1-2N0) disease on final pathology (positive predictive value [PPV] for early disease = 0.51). Of false positive cases, understaging was related to T-stage alone in 39% of cases, N-stage alone in 27% of cases, or both T

and N stage in 34% of cases. None of the clinical, MRI, or radiologist-related factors that we assessed were associated with probability of correctly predicting early disease.

**Conclusions/Discussion:** A significant portion of patients with MRI-predicted early rectal cancer are understaged. These patients do not receive neoadjuvant treatment, potentially placing them at increased risk of local recurrence. These results highlight the challenges of making radiographic determinations of pathology-based staging systems. While MRI is useful in characterizing more advanced disease with obvious invasion or metastasis, differentiation of T2 from early T3 lesions or recognition of microscopic nodal metastases presents a real challenge. In order to make better pre-operative treatment decisions, more reliable and measurable clinical classification systems that match available diagnostic capabilities must be developed.

### PROGNOSTIC IMPACT OF EARLY RECURRENCE AFTER CURATIVE SURGERY FOR COLORECTAL CANCER.

P356

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**Purpose/Background:** Purpose: Despite curative surgery for colorectal cancer, some patients experience recurrence of cancer. Whether early recurrence is associated with a shorter survival period compared with late recurrence remains controversial. Because predicting recurrence intervals would allow for appropriate therapeutic strategies, we evaluated the risk factors and prognostic impact of early recurrence of colorectal cancer.

**Methods/Interventions:** Methods: Patients who developed recurrence after curative resection for colorectal cancer stage I–III between January 2005 and December 2012 were identified (N=921). Early recurrence was defined as recurrence within 1 year after primary surgery of colorectal cancer. Analyses were performed to compare the clinicopathological characteristics and survival rate between the early and late recurrence groups.

**Results/Outcome(s):** Results: Three hundred eighty-six patients experienced early recurrence and 535 had late recurrence. Multivariate analysis revealed that male patients, pTNM, preoperative CEA, tumor size, histologic grading, and adjuvant chemotherapy correlated with the early recurrence. The pattern of systemic recurrence (88.6%) was more common in early recurrence, among them liver metastasis was most common (39.1%). The overall survival rates for early and late recurrence were significantly different (38.6% vs. 61.5%;  $P < 0.001$ ). In subgroup analyses, there were significantly lower overall survival rate in early recurrence group according to stage (stage I, 63.9% vs. 77%,  $P < 0.001$ ; stage II, 40.2% vs. 66.7%,  $P < 0.001$ ; stage III, 34.3% vs. 54.5%,  $P < 0.001$ ) and primary tumor location (colon, 37.5% vs. 54.9%,  $P < 0.001$ ; rectum, 39.4% vs. 66.8%,  $P < 0.001$ ). In multivariate analysis, early recurrence was an independent predictor for unfavorable overall survival.

**Conclusions/Discussion:** Conclusions: Poor survival outcome was associated with early recurrence within 1 year for patients who underwent curative resection for colorectal cancer.

### YOUNG AGE COLORECTAL CANCER SEEMS TO BEHAVE DIFFERENTLY FROM OLD AGE COLORECTAL CANCER.

P357

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**Purpose/Background:** Clinical experiences and literatures stimulated us to investigate possible discrepancy in biologic differences between old and young colorectal (CRC) patients.

**Methods/Interventions:** Records of 723 consecutive patients with sporadic CRC who underwent curative surgery between September 2007 and August 2012 were reviewed. Clinicopathological parameters, survival, and prognosis of 127 patients younger than 50 years (group Y) were compared with 596 older patients (group O).

**P355 Table 1. MRI prediction of early rectal cancers in patients (N = 83) who underwent upfront surgery.**

	Prediction of pT1-2N0 disease	Prediction of pT1-2 disease	Prediction of pN0 disease
True positive (N)	42	53	58
False positive (N)	41	30*	25**
PPV	0.51	0.64	0.70

True positives (TP) are patients with early disease who were predicted to have early disease by MRI. False positives (FP) are patients with more advanced disease than predicted by MRI (understaged). Positive predictive value,  $PPV = TP / (TP + FP)$ .

\*Final pathology in false positives case related to T-stage: 28 pT3, 2 pT4

\*\*Final pathology in false positives cases related to N-stage: 22 pN1, 1 pN2, 2 pN3

**Results/Outcome(s):** Tumors in group Y showed higher incidences of mucin production ( $P=0.017$ ), MSI-high ( $P=0.001$ ), and N2 stage ( $P=0.020$ ). Mean number of retrieved lymph nodes in group Y was also higher significantly ( $P=0.001$ ). Recurrence rates ( $P=0.665$ ), overall 5-year survivals ( $P=0.459$ ) and disease-free survivals ( $P=0.511$ ) were similar. Univariate analysis revealed cellular differentiation, lymphovascular/perineural invasion, stage, and preoperative CEA were significant prognostic factors. Subset analysis showed differences between groups. Cellular differentiation and lymphovascular/perineural invasion did not have prognostic power in group Y. MSI-high status was significant only in group Y. Multivariate analysis revealed cellular differentiation and pathologic stage were significant prognostic factors in both groups.

**Conclusions/Discussion:** Pathologic characteristics and prognostic factors, especially MSI-high status, were different between old and young CRC patients. This may provoke further clinical and biological studies to confirm if young age CRC behaves differently from old age CRC.

#### IMPACT OF KRAS MUTATION & ERCC1 OVER-EXPRESSION ON OXALIPLATIN-BASED CHEMOTHERAPY IN METASTATIC COLORECTAL CANCER PATIENTS.

P358

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**Purpose/Background:** FOLFOX regimen is being widely used as the first-line adjuvant chemotherapy for CRC since the 1990s. With the revelation of nucleotide excision repair (NER) pathway playing an important role, there have been various efforts to predict oxaliplatin resistance by studying excision repair cross-complementing 1 (ERCC1). Recent studies report that KRAS mutational status is correlated to expression of ERCC1. According to these observations, we hypothesized that KRAS mutational and ERCC1 overexpression status might be associated with resistance to oxaliplatin in CRC patients. By studying the KRAS mutation/ERCC1 overexpression status of CRC patients who underwent curative resection and their survival after oxaliplatin based chemotherapy, we aimed to elucidate the potential of KRAS and ERCC1 as predictive factors of oxaliplatin resistance.

**Methods/Interventions:** Between 2009 and 2014, 311 metastatic colorectal cancer patients were enrolled. We retrospectively analyzed the clinicopathologic features, and the status of KRAS mutation and ERCC1 overexpression in 156 colorectal cancer patients who received FOLFOX chemotherapy and curative intent surgery. Their overall survival and disease-free survival according to the KRAS and ERCC1 were analyzed.

**Results/Outcome(s):** Progression-free survival ( $p=0.0082$ ) and overall survival ( $p=0.0282$ ) of mutant KRAS group were poorer than wild-type KRAS group. There were no significant differences in overall survival and disease-free survival according to ERCC1 expression. However, Subgroup analysis showed that progression-free survival ( $p=0.0081$ ) and overall survival ( $p=0.0432$ ) of mutant KRAS group in ERCC1 under-expression were better than wild-type KRAS group, respectively, but no significant difference was found in the ERCC1 over-expression group.

**Conclusions/Discussion:** Colorectal cancers that show ERCC1 under-expression with mutant KRAS may lead to a better response to oxaliplatin. This study has shown that KRAS mutational status and ERCC1 expression status could be used as predictive biomarkers in oxaliplatin based chemotherapy.

#### MESORECTAL THICKNESS AS A POTENTIAL PREDICTOR IN TOTAL MESORECTAL EXCISIONS FOR RECTAL CANCERS.

P359

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**Purpose/Background:** Rectal cancer is one of the most common forms of large bowel cancer affecting Western populations. It is well recognised that surgical excision is the mainstay of treatment for rectal adenocarcinoma. Total mesorectal excision (TME) is recognised as a technique to reduce local recurrence rates. Little research has been conducted into the actual form and size of mesorectal tissue. Is there a link between BMI and mesorectal thickness? Is there a significant sex differentiation? Can mesorectal thickness be graded and linked to difficulty of excision? Whilst histopathological assessment criteria such as CRM, mesorectal grading (Quirke et al) have been extensively studied; only one article was found concentrating on mesorectal morphometric assessment using MRI (Torkzad & Blomqvist), They studied 25 consecutive patients without 'any large pelvic tumour' to assess volume and cross-sectional parameters based on the amount of mesorectum to different sides of the rectum and the total area occupied; using a transaxial 3D T1-weighted gradient-echo sequence. Mesorectum (including rectum) occupied an axial area ranging from 320-5992 sq mm and a total volume of 54-323 ml Form of mesorectal tissue differed between sexes: amount of fat posterior to the rectum was significantly more in men than in women Contour of mesorectal fascia was subject to impression by other nearby visceral organs

**Methods/Interventions:** This study was performed in collaboration with our radiology colleagues. Data analysed included 25 consecutive TME's performed by a single colorectal surgeon at a University Hospital between



2012-2015. The pelvic MRI images were reviewed (T1/T2) by a single gastrointestinal radiology consultant. The parameters looked at included patient demographics, disease stage, pelvic inlet diameter, mesorectal thickness at pre-determined set points and mesorectal volume. Patient BMI (weight and height) were also measured. Operative and postoperative (ELECTIVE surgery) data collected included: Open or laparoscopic/ conversion to open/ laparoscopic assisted Length of procedure Postoperative leaks Other postoperative complications

**Results/Outcome(s):** Our initial results suggest that the mesorectal thickness and volume measured at preoperative pelvic MRI scanning could potentially predict the ease of TME and allow for accurate planning of an elective rectal cancer resection. It is also linked to patient BMI and helps plan whether the procedure would be suitable for laparoscopic or open resection.

**Conclusions/Discussion:** This is a pilot study and more numbers would be required to further ascertain and confirm these findings. It would also be useful to compare these results with the final post-operative histology and highlight any discrepancies in pre-operative staging and whether these can be accurately rectified.

#### AGE AT DEATH OF PATIENTS WITH COLORECTAL CANCER AND THE EFFECT OF LEAD-TIME BIAS ON OVERALL SURVIVAL IN ELECTIVE VERSUS EMERGENCY SURGERY: A FOLLOW-UP ANALYSIS.

P360

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**Purpose/Background:** Studies addressing the potential benefit of early intervention are prone to lead-time bias, constituting an artificial improvement in cancer specific mortality. We have previously shown the presence of lead-time bias in a non-screened Scottish cohort of patients when the age at death (all cause mortality) was the primary end point. However a short and variable follow-up period limited conclusions during initial data analysis in 2008. We aimed to compare age at death for patients with colorectal cancer presenting on an emergency or elective basis in the same cohort with a minimum of ten years follow-up.

**Methods/Interventions:** Patients presenting with colorectal cancer over a six year period (2000-2006) were entered into a prospective database with analysis performed on 28<sup>th</sup> November 2016. Data regarding age at death, presentation type (emergency/elective), operative intent (palliative/curative) and disease stage were recorded. Results are presented as (mean, [95% confidence intervals]). Statistical analysis was undertaken using Student's t-test and a P-value of <0.05 was considered significant.

**Results/Outcome(s):** One thousand six hundred and forty nine patients (891 men) were identified. Elective patients presented younger than emergency patients (67.9 [67.3–68.5] vs 70.6 [69.4–71.8] years; P<0.0001), while Dukes B patients presented older than Dukes D (P = 0.003). Overall mortality was 72.7% at time of analysis; no difference was seen in mean age at death between emergency and elective presentation (73.6 [72.4–74.8] vs 73.5 [72.7–74.3] years; P = 0.912), however patients treated with curative intent survived longer compared to palliative treatment (74.6 [73.8–75.4] vs 71.2 [69.9–72.5] years; P<0.0001).

**Conclusions/Discussion:** Current colorectal cancer early detection strategies may improve cancer-specific survival by increasing lead-time bias but do not influence overall life expectancy. A longer follow-up period has demonstrated patients treated with curative intent have an improved survival; a finding that was not seen previously with a minimum follow-up period of two years.

#### IS THERE A DIFFERENCE IN RECTAL CANCER OUTCOMES BASED ON POSITION AND EXTENT OF CIRCUMFERENTIAL TUMOR INVOLVEMENT?

P361

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**Purpose/Background:** Tumor distance from the anal verge is a well-known correlate with outcomes. However, circumferential extent— anterior, posterior, or circumferential—may be an equally important criterion affecting operative technique and oncologic outcomes. While non-circumferential and posterior tumors are often more feasible technically due to the more robust posterior mesorectum, the implications of an anterior-based (AB) vs. posterior-based (PB) vs. circumferential (CL) tumor on patient outcomes has not been evaluated. We hypothesized that AB and CL tumors would have higher conversion rates, higher circumferential resection margins, and worse oncologic outcomes.

**Methods/Interventions:** We reviewed patients with primary rectal cancer undergoing curative resection at a tertiary academic medical center (2007- 2015). Palliative resections, and those with recurrent tumors or incomplete records were excluded. Tumor location was defined based on pre-neoadjuvant endoscopy, digital examination, or imaging as AB, PB or CL. Tumors were defined as AB or PB if they were describe as at least reaching midline. Demographics, staging, procedure performed, final pathology, postoperative complications, recurrences, disease-free and overall survival (OS) outcomes were determined. Primary outcomes were conversion rate and local recurrence rate.

**Results/Outcome(s):** 205 patients met inclusion criteria (mean age 63.1±13.0 years; 61.5% male). There were 64 patients with AB, 49 with PB, and 94 with CL tumors. Mean BMI was 28.3±7.4. 75.1% of patients received neoadjuvant chemoradiation. Mean tumor distance from the anal verge was higher in the CL patients (7.8±3.5 cm) than AB (6.6±3.6 cm) or PB (5.5±2.6 cm) patients (both  $P<0.04$ ). Laparoscopy was used in significantly fewer CL patients (38.3%) than AB patients (54.7%,  $P=0.04$ ), but in a similar percentage of PB patients (53.2%,  $P=0.09$ ). Laparoscopic conversion rates were higher in CL (18.1%) than PB patients (4.3%,  $P=0.03$ ), but there was no difference when comparing AB vs. PB and CL vs. AB (both  $P>0.3$ ). Pathology revealed positive circumferential margins in 7.9% of AB, 7.5% of CL, and none of the PB patients, but this did not reach statistical significance ( $P=0.3$ ). CL patients had a significantly higher percentage of T3/4 tumors (CL 64.7% vs. AB 40.4% vs. PB 43.2%,  $P<0.001$ ). At mean follow-up of 42.3±29 months, there was no significant difference in local (AB 7.8%, PB 4.3%, CL 6.4%,  $P=0.75$ ) or distant recurrences (AB-17.2%, PB 8.5%, CL-20.2%,  $P=0.2$ ) or OS (Log-rank  $P=0.38$ ) between groups.

**Conclusions/Discussion:** CL tumors were more advanced than AB and PB tumors and were associated with a significantly higher conversion rate. However, there was no difference in recurrence rates. When counseling patients on the need for conversion from a laparoscopic approach, circumferential tumor involvement should be considered.

#### INTACT: INTRAOPERATIVE FLUORESCENCE ANGIOGRAPHY (IFA) TO PREVENT ANASTOMOTIC LEAK IN RECTAL CANCER SURGERY.

P362

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**Purpose/Background:** Despite advances in surgery, there has been little progress in reducing the rate of anastomotic leak (AL) and associated morbidity. Of the many factors that contribute to AL, the surgeon has influence over the blood supply to the anastomosis. Ensuring that the bowel is adequately perfused is essential for healing, but is currently imprecise. IFA involves an intravenous administration of Indocyanine Green (ICG), which when irradiated with near-infrared light through an operating laparoscope, provides an image of tissue perfusion at the anastomosis.

**Methods/Interventions:** The IntAct trial will recruit a total of 880 patients undergoing elective anterior resection for rectal cancer from 25 sites throughout Europe to investigate the efficacy and mechanism of IFA in reducing

anastomotic leak. Two mechanistic sub-studies evaluating rectal blood supply and perfusion in patients with and without neo-adjuvant chemo/radiotherapy (n=75 patients) and the role of the rectal microbiome (n=200 patients) will further inform the understanding of the mechanisms underlying AL. Patients will be randomised on a 1:1 basis to receive either surgery with or without IFA. In both arms, the anterior resection (high or low) will be performed as per the surgeon's usual technique using either a laparoscopic or robotic approach. Patients in the IFA arm will receive 0.1mg/kg of 2.5mg/ml of ICG intravenously following mobilisation. Intracorporeal colonic and rectal stump perfusion will be assessed using near-infrared laparoscopy (PINPOINT; Firefly). Endoluminal assessment of anastomotic perfusion will be undertaken with a second bolus of 0.1mg/kg ICG.

**Results/Outcome(s):** All patients will be followed-up until 90 days post operation. All patients will undergo rectal contrast enema examination at 4-6 weeks post-operation. The primary endpoint is clinical AL within 90 days post-operation. Secondary endpoints include radiological AL, changes in planned anastomosis, defunctioning stoma, complications, hospital stay, LARS score, re-interventions, quality of life, health resource use and death. Sub-study endpoints will include the influence of vascular anatomy, rectal perfusion, and rectal microbiome on AL.

**Conclusions/Discussion:** The IntAct trial will evaluate a new technology that allows surgeons to easily assess intra-operative tissue perfusion and minimize one of the biggest risk factors for AL. The incorporation of two sub-studies evaluating rectal blood supply and perfusion in patients with and without neoadjuvant chemo/radiotherapy, and the role of the rectal microbiome in AL, adds an exciting dimension that will further inform our understanding of the mechanisms underlying AL.

#### MODELING SOLITARY COLORECTAL CANCER USING A MURINE COLONOSCOPY IMPLANTATION MODEL TO DETERMINE THE ROLE OF THE MICROBIOME ON LOCAL AND DISTANT METASTASIS FOLLOWING SURGICAL RESECTION.

P363

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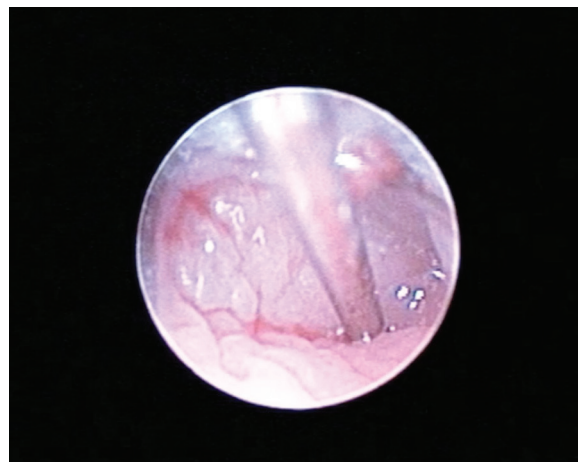
**Purpose/Background:** Anastomotic leakage (AL) is a feared complication of colorectal surgery for cancer and can have potentially fatal consequences. Studies have shown that AL may have a negative impact on oncologic outcomes. Previous work from this lab has shown that members of the intestinal commensal microflora may contribute to AL through the bacteria's collagenolytic capabilities. It has also been shown that alternations in gut microbiota are associated with increases in colon

tumorigenesis. The aim of this study was to determine the feasibility of creating a reliable model of solitary colorectal cancer (CRC) in mice with a predictable metastatic rate. Our goals are to perform surgical resection and determine the role of the microbiome and anastomotic healing on local and distant metastasis in this model.

**Methods/Interventions:** 10 week old BALB/c mice underwent ridged scope endoscopy with 1.9mm Karl Storz Coloview miniendoscopic system. A custom 8-inch, 30 gauge needle was inserted through the endoscope for submucosal injections. CT26 is a BALB/c derived colon carcinoma cell line with an 8% metastatic rate to the liver. A cell concentration of  $1 \times 10^5$  was injected 3-4mm from the anal verge.

**Results/Outcome(s):** At the time of this abstract publication, serial endoscopy has demonstrated consistent and reproducible access to the distal colon, insertion of the needle, and injection with a 10% perforation rate. Implantation of murine CRC into distal colon submucosa during endoscopy is a technically feasible approach for growth of a solitary tumor that has metastatic potential and is accessible for surgical resection with primary anastomosis in an immune competent organism.

**Conclusions/Discussion:** With the rise popularity of routine endoscopy in human medicine, murine endoscopy has become increasingly utilized for intra-luminal tissue surveillance and implantation of murine and human CRC cells. By utilizing an endoscopic technique in our experimental design, the mice are subjected to minimal trauma and procedural stress. This allows us to more closely mimic, in a mouse model, the discovery and ultimately the treatment of colorectal cancer. We will further subject our model to pre-operative antibiotics and a "Western diet" which are risk factors for the development of post-operative anastomotic complications. Utilizing murine CRC cells with bioluminescence and fluorescence, in-vivo imaging and histological evaluation will aid in identification of tumor regional recurrence and metastasis after surgical resection. By recreating the course of events prior to and following surgery for patients with CRC, this model aims to better understand the role of alternations in the gut microbiome on tumor recurrence following surgical resection.



Murine distal colon, 3mm from the anal verge, with injection of CRC cells into the submucosa

### SOCIOECONOMIC STATUS: IS IT A PROGNOSTIC FACTOR OF OVERALL SURVIVAL IN COLORECTAL CANCERS.

P364

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**Purpose/Background: Introduction** Socioeconomic status is a marker of standard of living which indirectly reflects on dietary behavioural habits, physical activity & education of population. Many studies have shown these factors influence the patient perception of disease, selection of treatment option and adherence to treatment protocol and also on natural history and oncological outcomes of many cancers. In a diverse country like India, nearly 70% of population reside in rural areas, there is significant inequality in socioeconomic status among population. Gap between rich and poor is quite wide compared to other developed countries. Studying influence of SES on cancer in this population can elucidate better on its role in oncological outcomes. Hence in this study we are assessing influence of socioeconomic status on epidemiology and oncological outcomes of colorectal cancer in Indian scenario.

**Methods/Interventions:** Retrospective study of all newly diagnosed patients of colorectal adenocarcinoma registered over 1 year were included. All cases were discussed in multidisciplinary tumor board meetings and treated as per standard prevailing guidelines. Patients registered into Private category and General category – As per their affording capabilities. Patients in general category get subsidy for all their investigations, interventions and medications. On admission, they are eligible for the general ward as against the private patients who have an option of going for twin sharing or private single rooms

**Results/Outcome(s):** 776 colorectal patients were treated over 12 months. Median follow up period was 27.73 months. There was a significant difference in stage

at presentation, with 33.2% general category patients presenting in stage IV vs 25.2% private patients. Also in the operated patients the T and N stage was significantly higher in general patients. Among those treated with curative intent, recurrence rate was 19.5 % in private vs 14% in general category, however total number of deaths was 32% in general vs 25.3% in private category patients. Thus mean overall survival for general category patients was 30 months vs 32 months for private category, which is significant.

**Conclusions/Discussion:** Socioeconomic condition does play a role, not only in etiology but also the stage at presentation as well as overall survival in colorectal patients

**PERIOPERATIVE QUALITY OF LIFE AND COST-EFFECTIVENESS ANALYSIS OF LOW ANTERIOR RESECTION/TOTAL MESORECTAL EXCISION AND DIVERTING ILEOSTOMY FOR LOCALLY ADVANCED RECTAL CANCER: A COMPARISON OF ROBOTIC, LAPAROSCOPIC AND OPEN APPROACHES.**

P365

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**Purpose/Background:** Since the advent of robotic surgery, the role of the robot in surgical management has been under debate. The most consistent support of robotic technology in colorectal surgery has been for use in pelvic surgery and total mesorectal excision (TME). Studies up to this point have not compared the healthcare utilization cost per quality of life ratio for low anterior resection with diverting ileostomy (LARdi) and TME for locally advanced mid to distal rectal cancer.

**Methods/Interventions:** A retrospective review from December 2013 to October 2016 of a prospectively

collected database of rectal cancer patients who participated in a validated quality of life (QoL) survey. Patient demographics, tumor characteristics, perioperative outcomes and treatment methods were collected. All patients underwent LARdi/TME after completion of neoadjuvant chemoradiotherapy. Patients had QoL surveys performed after LARdi/TME but before ileostomy reversal. A healthcare utilization cost formula for the period including LARdi/TME to the first postoperative visit was developed to account for healthcare dollars utilized based on perioperative outcomes and surgical measures. QoL for the perioperative period was calculated from the EORTC-C30 questionnaire and perioperative cost-effectiveness was determined by dividing the results of the cost formula by the adjusted QoL of each patient during the perioperative period.

**Results/Outcome(s):** There were no significant differences between patient demographics or tumor characteristics between the robotic, laparoscopic, or open groups. Median follow up was 64 days after LARdi/TME. All major groups had a decrease in QoL from the preoperative to postoperative period; this decrease was similar across the three groups. The median cost of the procedure and associated complications was highest in the overall robot group at \$17790.27 and lowest in the open group at \$13593.89. When the robot group was subdivided into procedures performed on the S versus the Si, the median cost for the Si was much lower at \$13606.95. The median cost per QoL in the postoperative period which was the highest in the overall robot group at \$38866.14 and lowest in the laparoscopic group at \$19149.50. When the Si robot group was examined separately, the median cost per QoL was \$28,241.40. (Table 1)

**Conclusions/Discussion:** This study shows a trend toward improvement in the cost as well as the cost per quality of life for robot LARdi/TME as time and technology progresses. This appears to be a function of decreasing operative time and decreased conversion rates. Overall, no significant difference in cost, quality of life

P365 Table 1

	Total Robot	S Robot	Si Robot	Laparoscopic	Open
Number of patients	19	10	9	6	3
Median BMI	28.5	27.39	28.59	25.63	28.48
Median Distance from Verge (cm)	9.0	8.5	9.5	8.5	8
Gender (% Male)	68.42	60.00	77.78	33.33	66.67
Median Length of Stay (days)	6.0	6.5	5.0	6.5	9.0
Median Operative Time (minutes)	501.0	537.5	451.0	283.5	261.0
Median Estimated Blood Loss (mL)	100	150	100	100	200
Median Cost (USD)	17790.27	22049.60	13606.95	16370.70	13593.89
Cost Standard Deviation	23174.38	27762.40	7903.50	4593.10	8357.48
Median Cost/QoL	38866.14	53021.10	28241.40	19149.50	20316.99
Cost/QoL Standard Deviation	41506.76	49615.83	13005.24	3761.00	20830.41
Median Postop QoL	66.7	70.8	66.7	83.3	58.3

or cost-effectiveness was noted among the approaches to LARdi/TME. Our study is limited by small sample sizes in some of the groups as a result of changing practice patterns.

### PRIMARY COLORECTAL CANCER WITH URINARY BLADDER INVOLVEMENT: ANALYSIS OF 50 CONSECUTIVE CASES.

P366

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TAICHUNG, Taiwan

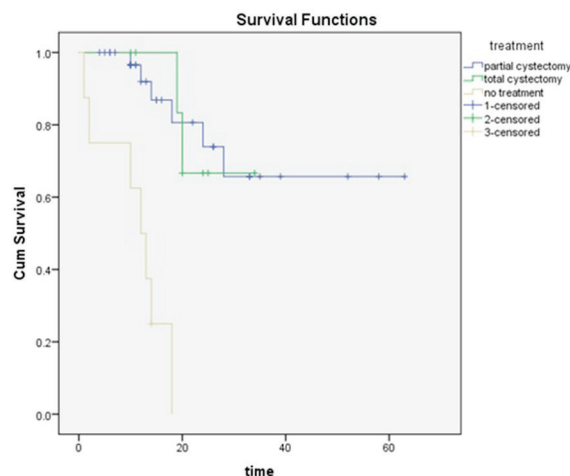
**Purpose/Background:** There is paucity of data on clinical presentation and outcome of primary CRC involving bladder due to infrequent cases and. This is a single center study assessing the clinical characters and management and outcome of 50 consecutive primary CRC with bladder involvement.

**Methods/Interventions:** Between 2006 to 2015 retrospective records of colorectal cancer with T4b were collected and CRC with bladder involvement were included in the study. Demographic data, clinical symptoms and signs, preoperative evaluation, operative procedure, pathological staging, adjuvant therapy and follow-up status were analyzed

**Results/Outcome(s):** The mean age in this study was  $64 \pm 14$  years. Thirty four (68%) patients first visited colorectal surgeons clinic. Eleven(22%) patients presented to emergency directly with symptoms of lower pain abdomen, abdomen distention. The most common symptom of patients who first visited colorectal surgeons were hematochezia (n=12, 24%). Mean time to diagnosis between the colorectal surgery department and non-colorectal surgery department is 8.17days verses 64.43 days ( $P > 0.0040$ ). In this case series most common site of colorectal cancer with bladder invasion was sigmoid 32 (64%)patients. Type of colorectal procedures done were Laparoscopic low anterior resection-7(14%), Laparoscopic anterior resection-7(14%), Anterior resection-22(46%), Hartman's -3(6%), diversion stoma -5(10.6%), APR-1(2%), Colonic stenting -1(2%), Right hemicolectomy-1(2%). There were 81% (35/43) patients received partial cystectomy. Final pathology report showed 88% (38/43) patients with definite evidence of bladder invasion.. Median follow-up for the patients was  $18 \pm 13$  months. Two cases of local recurrence was found after operation 9 months and 17 months. Thirty four (68%) patients underwent adjuvant therapy and 8 (16%) patients underwent neoadjuvant therapy. Most of the cases in this series are in Stage 3- 44% (22), others include stage 2- 32% (16), stage -4 24% (12). Nodal status in this series are-N0-18(41%), N1-14(32%), N2-11(25%). Post-operative morbidity occurred in 19%(9/47) patients. There is no 30 day hospital mortality. Local bladder recurrence was in 2 (4%) cases and metastasis occurred in 20 (40%) cases, 12(24%) patients had synchronous metastasis. Fourteen (28%) patients died during follow-up

period and 11(22%) patients lost follow up. Kaplan Meier analysis comparing overall survival between no treatment, partial and total cystectomy showed poor survival with no treatment and similar survival comparing partial with total cystectomy.(Fig-1)

**Conclusions/Discussion:** There is significant delay in the referral if the patient is seen primary by non-colorectal surgeon. Laparoscopic surgery for locally advanced CRC with bladder invasion is feasible. Overall survival is almost similar comparing partial cystectomy and radical cystectomy



### STARTING A ROBOTIC COLORECTAL SURGICAL SERVICE IN A COMMUNITY HOSPITAL: IMPORTANCE OF PRECEPTORSHIP AND TRAINING.

P367

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**Purpose/Background:** Robotic colorectal surgery is gaining popularity throughout the UK. Robotic surgery is a relatively new technique that is evolving in several specialties. The aim of this study was to evaluate our experience of elective robotic colorectal surgery performed with appropriate preceptorship and training.

**Methods/Interventions:** To assess factors related to the learning curve of robotic colorectal surgery including the number of operations performed, the type of procedures and oncologic resection margins. We evaluated the operative data of elective robotic colorectal surgeries performed during a 12 month by a single experienced laparoscopic board certified colorectal surgeon. All the procedures were supervised and mentored by a Royal College of Surgeons of England robotic surgery trainer.

**Results/Outcome(s):** The mean age of the study population was 70 years (range 53-81). There were 3 females. Indications for surgery included 6 cancers and 2 high grade dysplasia. 3/6 cases had T2 and 3/6 cases had T3, and

none of the patients had metastatic disease. The average BMI in this cohort was 27 (range 19-40). Operations included 5 anterior resection of which 2 were diverted, one Abdomino-perineal excision of the rectum, one Hartman's procedure and one case of right colectomy and ileocolic anastomosis combined with right partial nephrectomy. Mean operative time was 440 (range 350-512) minutes. The average hospital stay was 8 (range 3-20) days. None of the patients required conversion to open or laparoscopic surgery. One patient died due to necrotising fasciitis.

**Conclusions/Discussion:** Our results show that it is possible to achieve safe and adequate robotic colorectal resections during the early stage of the learning curve of a surgeon. This is achieved by suitable training and preceptorship. The early results obtained in our institution should encourage surgeons to adopt this technique into their colorectal practice.

#### ROLE OF ADJUVANT CHEMOTHERAPY IN LOCALLY ADVANCED RECTAL CANCER PATIENTS TREATED WITH NEOADJUVANT CHEMORADIATION FOLLOWED BY CURATIVE RESECTION.

P368

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**Purpose/Background:** Adjuvant chemotherapy (aCTx) for patients who underwent curative resection after neoadjuvant concurrent chemoradiation (nCCRT) is a controversial issue for locally advanced rectal cancer (LARC). This study aimed to investigate benefit of aCTx followed by curative resection after nCCRT for LARC.

**Methods/Interventions:** Clinicopathologic data of patients who underwent curative resection after nCCRT between January 2006 and December 2012 were reviewed retrospectively. A total of 369 patients with ypTanyN0M0 were included. Of them, 310 patients received aCTx (aCTx group), and 59 patients did not (no CTx group). Mostly, long course radiotherapy with 5-fluoruracil based regimen was adapted for nCCRT. We evaluated differences in patients' characteristics between the two groups and analyzed prognostic factors for overall survival (OS). In addition, binary subgroups stratified according to histologic types (well-differentiated (WD subgroup, n=65) vs. moderately-, poorly- differentiated, mucinous and signet ring cell types (non-WD subgroup, n=295) were analyzed to identify subgroups which may benefit from aCTx. Histologic types in 9 patients were not available from data base.

**Results/Outcome(s):** The only difference in patients' demographics was age (aCTx vs. no aCTx; 57.58±10.861 vs. 66.98±12.057, p=0.002) between the two groups. In multivariate analysis for prognostic factors of OS, the

patients with older age (HR, 2.922; 95%CI, 1.478-5.778; p=0.002), low rectal cancer (HR, 2.278; 95%CI, 1.128-4.601; p=0.022) or higher ypT stage (HR, ypT0 : 1 : 2 : 3 : 4 = 1 : 1.232 : 2.548 : 6.583 : 17.831; p=0.002) showed statistically significant shorter OS. The use of aCTx was not associated with OS in the whole population. In the WD subgroup analysis (n=65), 58 patients received aCTx (WD-aCTx), and 7 patients did not (WD-no aCTx). No differences existed in the demographic data between the WD-aCTx and the WD-no aCTx group. The use of aCTx was the only statistically significant favorable prognostic factor for OS in the WD subgroup (HR, 0.178; 95%CI, 0.032-0.981, p=0.048). The 5-year OS of the WD-aCTx group was higher than the WD-no aCTx group (91.2% vs. 64.3%, p=0.025). In contrast, in the non-WD subgroup analysis, both the non WD-CTx and the non WD-no CTx subgroups had similar 5-year OS (86.70% vs. 85.40%, p=0.407).

**Conclusions/Discussion:** The use of aCTx did not show benefit in the whole population with ypTanyN0M0. However, the use of aCTx affected OS in the WD subgroup, resulting in survival gain of 26.9%. Histologic type itself was not a prognostic factor, but it was a predictive factor for aCTx impact on patients who received nCCRT followed by curative resection for LARC. It implies that patients with WD adenocarcinoma may benefit from aCTx after nCCRT with curative resection in LARC.

#### ADJUVANT CHEMOTHERAPY AFTER RADICAL RESECTION FOR RECTAL CANCER: ARE GOALS OF TREATMENT BEING ACHIEVED?

P369

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**Purpose/Background:** Although 5-FU based adjuvant chemotherapy is commonly employed in the management of high risk stage 2 and stage 3 rectal cancer following neoadjuvant long course chemoradiotherapy and TME surgery, the benefit has been questioned. Furthermore, poor adherence to chemotherapy protocols has been reported due to intolerance and toxicity. The objective of this study was to determine the proportion of eligible patients who are offered adjuvant chemotherapy and complete the original treatment plan without modification. A secondary objective was to identify the toxicities associated with a modified treatment plan.

**Methods/Interventions:** The provincial Rectal Cancer Registry is a prospective database that captures all patients diagnosed with rectal cancer in the province. The Registry was searched retrospectively for all patients diagnosed with rectal cancer in the province for 2015. The provincial electronic medical record was reviewed for adjuvant chemotherapy treatment plans. Modified treatment plan

was defined as an inability to start the treatment in a timely manner (>3 months), a delay between cycles, a decrease in dose or premature termination.

**Results/Outcome(s):** In 2015, 325 patients had a radical resection for rectal cancer in the province. Of the 268 patients with stage 2 or 3 disease, 192 were offered adjuvant chemotherapy. 31(16%) patients declined chemotherapy while 15(8%) were unable to start because of a post-op complication. Only 49(34%) of the remaining 146 patients completed the original treatment plan without modification while 97(66%) patients had at least one toxicity that resulted in a modified treatment plan including 30(21%) patients who had their chemotherapy terminated before completion. Of the patients who required a modified treatment plan, 58% had one toxicity, 38% had 2 toxicities and 4% had 3 or more toxicities. The most frequent toxicities were GI related (63%), neuropathy (30%) and hand-foot syndrome (28%).

**Conclusions/Discussion:** Patients eligible for adjuvant chemotherapy following radical resection of rectal cancer with curative intent commonly do not complete the prescribed treatment due to refusal, inability to deliver therapy within an acceptable time period or toxicity. Only 26% of patients offered adjuvant chemotherapy were able to complete their originally prescribed treatment plan. Further studies are warranted to identify strategies to achieve better patient compliance with recommended treatment protocols.

#### REMOVAL OF BENIGN “DIFFICULT” POLYPS NOT AMENABLE TO COLONOSCOPY ALONE, UNDER EPIDURAL OR SEDATION/ LOCAL ANESTHESIA, IS POSSIBLE: PROSPECTIVE PILOT STUDY.

P370

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**Purpose/Background:** The aim of the study is to evaluate the safety and feasibility of combined Needlescopic (laparoscopic surgery using 3mm instruments)/Colonoscopy removal of “difficult” polyps under epidural or sedation/local anesthesia and to evaluate the clinical and oncological outcomes after this novel surgical approach.

**Methods/Interventions:** Prospective pilot study with 10 patients (pts), male and female undergoing Combined Needlescopic and Colonoscopic Surgery for benign polyp not removable by colonoscopy. Three options for anesthesia were offered: 1) Spinal or Epidural anesthesia using 0.75% Bupivacaine (Spinal) and 2% Lidocaine (Epidural); 2) MAC (Monitored Anesthesia Care) – sedation accompanied by surgeon administered local anesthetic at abdominal site; and 3) GETA (general with endotracheal tube intubation) if the first two options were not medically or technically feasible, or if resection was needed. Sedation

and local anesthesia feasibility was defined as surgery completed under the options 1 and 2 above. The clinical and oncological outcomes measured were: surgery completion without intubation, intraoperative complications, surgical pathology diagnosis, and polyp recurrence.

**Results/Outcome(s):** Nine pts with benign polyp on preoperative biopsy were enrolled in the study (Table). Seven pts. had epidural anesthesia, one pt MAC and one GETA. The pt with GETA initially started the surgery with epidural but after the polyp was not liftable from the colon wall, pt was intubated and surgery proceeded with resection. There were no any intraoperative complications. One pt had malignant polyp on surgical pathology, was readmitted and consequently underwent elective bowel resection. There were no recurrences (Table).

**Conclusions/Discussion:** Removal of benign polyps not amenable to colonoscopy alone, under epidural or sedation/local anesthesia appears feasible and safe. Intestinal surgery should be considered, in certain circumstances, under epidural or sedation/local anesthesia.

#### P370 Results

Variable	N=9
Female	3
Age yrs. median (range)	75(68-89)
BMI kg/m2 median (range)	27(20.5-29.9)
ASA median (range)	2(2-3)
Preop Bx of Polyps	
Benign	9
Polyp location	
Cecum	5
Right colon	2
Hepatic flexure	2
Polyp size median (range)cm	3.6 (1.2-5.09)
Intubation during surgery	1
Operative time min	81(48-180)
Postoperative Hospital Stay (days)	0(0-10)
Post op Complications 30days	0
Surgical pathology	
Benign	8
Malignant*	1
Reoperation*	1
Readmission*	1
Recurrence 12 months	0
New Polyps 12 months	1
Follow up 30 days	9
Follow up 12 months	6

\*The pt with malignant polyp was readmitted for elective bowel resection

### IS HEMICOLECTOMY AND HIGH TIE THE ONLY OPTION FOR SPLENIC FLEXURE AND DESCENDING COLON CANCERS?

P371

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**Purpose/Background:** Splenic flexure and descending colon cancers are routinely offered left hemicolectomy with high ligation of inferior mesenteric artery (IMA). The latter ensures oncologic radicality but leads to excessive bowel resection. Selective left colic artery (LCA) ligation with lymph node dissection (LND) along IMA trunk can avoid unnecessary long bowel segment resection while preserving oncological safety. The aim of the study is to demonstrate the advantage of IMA with selective LCA ligation over traditional high tie technique in splenic flexure and descending colon cancer.

**Methods/Interventions:** Patients treated electively for splenic flexure or descending colon cancer in 2008-2015 were selected from prospectively collected database. All patients underwent radical surgery either in the form of left hemicolectomy with high tie (1 group) or limited left colon resection within 20 cm proximally and distally from the tumor with IMA skeletonization and D3 lymph node dissection followed by selective LCA ligation (2 group). The procedures were performed either open or laparoscopically in both groups. To form comparable groups case-match selection was performed based on gender, age, body mass index, past abdominal surgeries, clinical stage, and tumor location. Primary evaluation of the fresh specimen was conducted by operating surgeon immediately after surgery. The visual evaluation of mesocolon fascia integrity and measurement in cm of proximal and distal resection margins and length of "vascular pedicle" were done. Lymph nodes (LN) were harvested from fresh specimen and allocated according to Japanese classification to I (paracolic), II (intermediate) and III (apical) groups.

**Results/Outcome(s):** A total of 34 patients were included in case-match analysis. The rate of open resections was not significantly different between groups. The length of removed colon, distal and proximal margins and vascular pedicle were not significantly different in open and laparoscopic procedures. The median length of resected bowel in the 1 group was  $412.4 \pm 16.5$  cm and it was significantly higher than in the 2 group ( $256.2 \pm 27.0$  cm,  $p=0,02$ ) but the total number of LN was not different between them ( $26.2 \pm 11.5$  and  $25.3 \pm 13.4$ ,  $p=0.84$ ), as well as the number of I group LN ( $18.4 \pm 2.5$  and  $17.3 \pm 4.4$ ,  $p=0,39$ ); II group LN ( $6.2 \pm 1.5$  and  $5.9 \pm 0.6$ ,  $p=0.43$ ) and III group LN ( $1.6 \pm 0.5$  and  $2.1 \pm 1.2$ ,  $p=0.14$ ).

**Conclusions/Discussion:** Hemicolectomy results in longer colon specimen because of high tie. Left colon resection with D3 lymph node dissection and selective LCA ligation enables shorter specimen with the same

amount of harvested LN thus not compromising oncologic results.

### PARTICIPATION IN BOWEL SCREENING AMONGST MEN ATTENDING ANEURYSM SCREENING: INCIDENCE AND FACTORS.

P372

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**Purpose/Background:** Population bowel cancer screening by Faecal Occult Blood test (FOBT) reduces bowel cancer related mortality. Overall uptake of FOBT screening in the Scottish population is 55%. Sex, age, deprivation and ethnicity are all recognised factors that influence uptake of screening. Abdominal aortic aneurysm (AAA) screening by one off abdominal ultrasound has recently been introduced nationally for men aged 65. The reported national uptake of AAA screening test is 79%. The aim of this study was to determine the impact of a health professional intervention on bowel screening uptake amongst men who previously failed to complete bowel screening.

**Methods/Interventions:** All patients appointed for aneurysm screening between September 2015 and March 2016 within NHS Tayside were included in our analysis. Patients who had not completed their latest FOBT and attended for aneurysm screening were interviewed by dedicated nurse specialists at the time of attendance. Reasons for not completing test were recorded and following education, patients were asked whether they would be like to complete a further FOBT. Subsequent completion of FOBT within 6 months of intervention was recorded.

**Results/Outcome(s):** In total, 556 patients have been included in our analysis. AAA screening uptake in our study was 85%. 130 (28%) of those patients had not completed recent FOBT bowel screening. 111 patients agreed to being interviewed. The primary reason described for not participating was the time taken to complete the test with many patients forgetting about it (35%). Other reasons include confusion regarding the purpose of the test (16%), disgust (20%), fear (6%) and other health problems (10%). Following a brief discussion and education 81% of patients interviewed then stated that they would like a further test to be sent and 49% have returned a completed test.

**Conclusions/Discussion:** Uptake of aneurysm screening is higher than that for bowel screening of men with similar age and socioeconomic demographics. Almost half of previous bowel screening non-responders subsequently returned a completed test following discussion with a nurse specialist. Attendance at other non-bowel screening appointments with education and discussion may provide a valuable opportunity to improve bowel screening uptake.



**A QUESTIONNAIRE ON THE CURRENT PRACTICES OF “WATCH & WAIT” RECTAL CANCER TREATMENT FROM AMERICAN SOCIETY OF COLON AND RECTAL SURGEONS, EUROPEAN SOCIETY OF COLOPROCTOLOGY, ASSOCIATION OF COLOPROCTOLOGY OF GREAT BRITAIN AND IRELAND, COLORECTAL SURGICAL SOCIETY OF AUSTRALIA AND NEW ZEALAND & BRAZILIAN SOCIETY OF COLOPROCTOLOGY.**

P373

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**Purpose/Background:** The “watch and wait” (W&W) approach for patients with a complete clinical response

to neoadjuvant chemoradiotherapy for rectal cancer is debated. Therefore, the aim of this study was to assess global W&W practices.

**Methods/Interventions:** After receiving IRB exemption, a multi-society approved questionnaire allowing anonymous replies to 30 multiple choice items was distributed to members of 4 societies in 3 continents. Results were analyzed on a descriptive level using Pivot Tables in Microsoft Excel. ANOVA analysis, univariate and multivariate analysis were performed to understand what factors contribute to a practitioner’s decision to use the W&W treatment approach.

**Results/Outcome(s):** There were a total number of 452 questionnaire responses, including 287 responses from ASCRS members (ASCRS response rate 13.7%). Table 1 depicts the results comparing ASCRS and non-ASCRS responses. Seventy-five percent of non-ASCRS responders

**P373 Comparison from ASCRS and non-ASCRS Members**

Variable	Affiliation				Associated with likelihood of using W&W P Value
	ASCRS n=287		non-ASCRS n=165		
	Yes	No	Yes	No	
Community Hospital	42%		61%		0.68
Academic Hospital	38%		37%		
Proctectomy platform:					
		Open	30%	55%	
		Laparoscopic	38%	42%	0.80
		Robotic	57%	4%	0.80
Believe in W&W	41%		75%		
Reasons for not believing in W&W:					
		Literature unconvincing	79%	46%	
		Concerned about follow up	70%	62%	
		Want long-term survival and recurrence data	78%	64%	
		Medical/legal concerns	72.5%	24.5%	
Hospital have a written protocol for W&W			55%	83%	
Consider patient characteristics for W&W:					
		Operation: LAR vs APR	86%		0.26
		Age	86%		0.69
		Multiple Co-morbidities	86%		0.76
Advanced training:					
		Colon and rectal surgery	58%		0.45
		Surgical oncology	59%		0.12

Chart 1- Comparing the questionnaire results from ASCRS and non-ASCRS responses. There was no significant finding to suggest a propensity to practice W&W with any surgeon practices or training.

believe in the philosophy of W&W compared to 41% of ASCRS responders. The most common reservations were concerns for long-term recurrence rates/overall survival. The majority of institutions do not have a standard protocol for W&W (ASCRS: 55%, non-ASCRS: 83%). ASCRS responders base their decision to use W&W on a combination of endoscopy (92%), physical exam (89%), MRI (79%) and biopsy (59%), with PET-CT (35%), CT (32%) less often. Eighty-six percent of ASCRS responders who believe in W&W consider patient factors when using W&W (high co-morbidities,  $p=0.76$ , advanced age,  $p=0.69$ , type of operation (LAR vs. APR),  $p=0.26$ ). Analysis of ASCRS responders showed there was no greater likelihood to practice W&W if associated with a university teaching institution ( $p=0.68$ ), if trained as a colorectal surgeon ( $p=0.45$ ), if trained as a surgical oncologist ( $p=0.12$ ), the number of years in practice ( $p=0.74$ ) or what platform the practitioner used (minimally invasive (laparoscopy/robotic) versus open) ( $p=0.80$ ).

**Conclusions/Discussion:** Although internationally W&W has been adopted, it has not standardized. ASCRS members were more likely to offer minimally invasive platforms but were less likely to offer W&W. Globally, the reasons for not using W&W included concerns for long-term oncologic follow up. The majority of non-USA hospitals do not have a written protocol for W&W patients. There were no statistically significant associations between the likelihood of employing W&W and the type of surgical training, years in practice, institutional affiliation, the use minimally invasive surgery or individual patient factors. In conclusion, W&W may not be accepted globally as a standard treatment, however its limitations maybe overcome with more robust data from future prospective randomized trials.

## ELECTIVE SURGERY FOR FAMILIAL ADENOMATOUS POLYPOSIS SURGERY: A CONSERVATIVE TREND.

P374

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**Purpose/Background:** Patients with Familial Adenomatous Polyposis (FAP) are usually recommended to have elective prophylactic colorectal resection to prevent the development of colorectal cancer. Such patients are often asymptomatic and the majority are young. The surgical options are total colectomy with ileorectal anastomosis (IRA) and total proctocolectomy with ileal pouch-anal anastomosis (IPAA), both of which can be performed laparoscopically. IRA is usually selected for patients with mild polyposis (<20 rectal polyps and <1000 colonic polyps) while more severely affected patients have an IPAA. Over time it has become apparent that the impact of IPAA on lifestyle is significantly worse than IRA. In addition IPAA seems more likely to stimulate desmoid disease. We suspected that in response to the poorer functional outcomes of IPAA, surgery for FAP at this institution has become more conservative. We designed this study to see if this is so.

**Methods/Interventions:** We used a previous publication from this Registry on the evolution of large bowel surgery for FAP from 1950 to 2007 as a baseline against which to compare more recent data. A prospectively collected inherited colorectal cancer database was queried to identify FAP patients undergoing large bowel surgery from 2008 to now. Only patients who had their index operations in our institution were included. Surgical treatment choice was compared between years. Outcomes and quality of life were compared between surgery types.

**Results/Outcome(s):** Between 2008 and 2016, 138 patients had their index FAP surgery performed in our institution. The mean age was 27 years-old. 82 patients (59%) had an IRA, 51 patients (37%) had an IPAA, 4 patients (3%) had total proctocolectomy with end ileostomy (TP EI), and 1 patient had proctocolectomy with

**P374 Type of operation, stratified by time period**

	Prepouch, Before 1983	1983-1991	1992-1999	2000-2007	2008-2014	2015-2016	Total
IRA	66 (97%)	74 (73%)	60 (56%)	81 (56%)	69 (57%)	13 (76%)	363
IPAA	-	28 (27%)	40 (42%)	62 (42%)	47 (39%)	4 (24%)	181
APR	2 (3%)	-	1 (1%)	2 (1%)	-	-	5
TPC	-	-	1 (1%)	1 (1%)	5 (4%)	-	7
Total	68	102	102	146	121	17	556

IRA - Total Colectomy with Ileorectal Anastomosis

IPAA - Total Proctocolectomy with Ileal Pouch-Anal Anastomosis

APR - Abdomino-Perineal Resection

TPC - Total Proctocolectomy with End Ileostomy

continent ileostomy (K pouch). The number of polyps in the rectum was the main indication for IPAA. 42 % of the patients submitted to IPAA had more than 20 polyps in the rectum vs. only 5% on patients submitted to IRA ( $p < 0.001$ ). Laparoscopy has been used in 80% of the total cases compared to 43% from 1992 to 2007 ( $p < 0.001$ ). More IRAs were done laparoscopically than IPAA (1992-1999, 56% and 13%; 2000-2007, 58% and 23%; 2008-2016, 87% and 75%, respectively). The current conversion rate is 2.8% for TAC, and 7.9% for IPAA ( $p = 0.227$ ). Of the IPAA 32% were one stage from 1992-2007 (without diversion), versus 16% from 2008-2016 ( $p = 0.002$ ). 21% had a mucosectomy and handsewn anastomosis from 1992 to 2007, versus 14% from 2008 to 2016 ( $p = 0.241$ ). 85% had J pouch configurations from 1992 to 2007, versus 92% from 2008-2016 ( $p = 0.174$ ).

**Conclusions/Discussion:** The trend in selection of surgery for patients with Familial Adenomatous Polyposis is more conservative now than in the past. This may be a reaction against the morbidity of total proctocolectomy with ileal pouch-anal anastomosis, in younger patients.

## THE INFLUENCE OF SCREENING ON OUTCOMES OF CLINICALLY LOCALLY ADVANCED RECTAL CANCER.

P375

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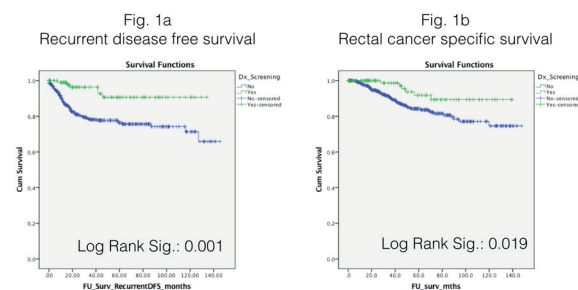
**Purpose/Background:** Screening for colorectal carcinomas leads to lower incidence rates and earlier detection. Although rectal cancer is often discovered due to symptoms because of its low location, there are patients diagnosed with rectal cancer through screening who present with locally advanced disease. This study evaluates the influence of screening on the outcomes of patients with clinically locally advanced rectal cancer.

**Methods/Interventions:** All rectal cancer patients who received neo-adjuvant treatment for clinically AJCC stage II or III rectal cancer with no baseline metastasis and who got surgical treatment between 2004 and 2015 at a single center were included from a retrospective, IRB approved, prospectively maintained database. The cohort was divided based on whether the diagnosis was made through screening or not. Short and long-term outcomes were compared between these two groups.

**Results/Outcome(s):** A total of 314 rectal cancer patients who received neo-adjuvant therapy were included, of whom 42 (13.4%) were diagnosed through screening. There were no significant differences between the two groups in gender, age, and BMI. ASA-score was slightly higher in the unscreened group (2.26 vs. 2.12;  $P < 0.001$ ). Clinical AJCC II and III rates were similar for screened and unscreened patients. While operative duration was

comparable for the two groups, admission duration was significantly shorter in the screened group (medians 4 vs. 5 days;  $P = 0.029$ ). Post neo-adjuvant treatment pathologic AJCC staging was significantly lower in the screened group and more than two times the number of complete responses (33.3% vs. 14.3%;  $P = 0.002$ ). Long-term distant metastatic recurrence rate was 4.8% in the screened group, compared to 15.4% in the unscreened group ( $P = 0.063$ ), and local recurrence rates also showed a clinically significant difference (screened 0% vs. unscreened 7%;  $P = 0.088$ ). A multivariable cox regression model regarding recurrent disease, comparing screened to unscreened patients, confirmed these findings (adjusted for adjuvant therapy, HR: 0.209 [95%CI: 0.051 – 0.861]  $P = 0.030$ ). This resulted in significantly better recurrent disease free survival for screened patients, as well as a better overall disease specific survival (see respectively fig. 1a and 1b).

**Conclusions/Discussion:** Screening for CRC leads to better long-term outcomes even in patients found to have clinically locally advanced rectal carcinoma. This reinforces the need for screening colonoscopy and its potential to improve outcomes.



Both graphics are Kaplan Meier curves

## STAGE II COLON CANCER PATIENTS: THE “IMPLICIT BIAS OF AGE” – OVERUTILIZATION AND UNDERUTILIZATION OF CHEMOTHERAPY.

P376

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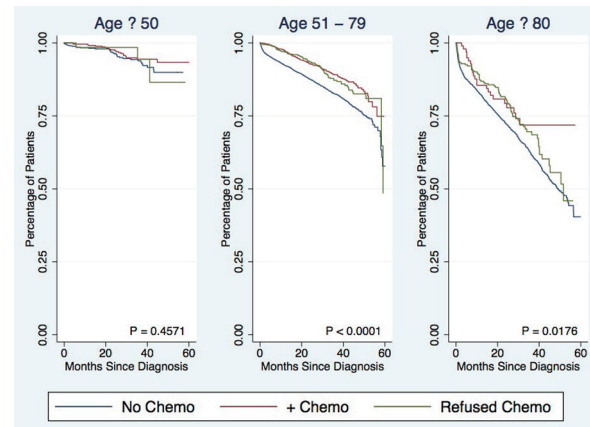
**Purpose/Background:** While survival rates for colon cancer have increased, the improvement has been less pronounced in the elderly population. Studies suggest that elderly patients are less likely to be offered optimal treatment for colon cancer. Elderly patients are a heterogeneous population, and the decision to pursue systemic therapy is likely dependent on many individual factors. To date, guidelines from the National Comprehensive Cancer Network (NCCN) recommend surgical resection followed observation for stage II colon cancer, and for consideration of adjuvant chemotherapy only in the setting of high-risk features. The objective of this study was to evaluate the

impact of age and chemotherapy on survival in stage II colon cancer.

**Methods/Interventions:** The US National Cancer Data Base (2004-2012) was reviewed for patients with stage II adenocarcinoma of the colon, and stratified by age and receipt of chemotherapy (none, received, refused). Correlations were analyzed with ANOVA and chi-square tests. Kaplan-Meier and Weibull survival analyses were performed.

**Results/Outcome(s):** Of 13,583 patients evaluated, 8.5% were  $\leq 50$  (5-yr survival: 91.3%), 62.5% were 51-79 (5YS: 60.4%), and 29.0% were  $\geq 80$  (5YS: 41.2%). A minority of patients received (N=2,197, 16.2%) or refused (N=1,017, 8.9%) chemotherapy. Receipt of chemotherapy was inversely proportional to age (40.7% of patients  $\leq 50$  years, 19.2% patients age 51-79, 2.5% patients  $\geq 80$  years,  $p < 0.0001$ ). While the presence of high risk features were directly proportional to age (31.0%  $\leq 50$ , 38.7% 51-79, 55.6%  $\geq 80$ ,  $p < 0.0001$ ). Patients who received chemotherapy had improved survival over patients who did not receive it (including those who refused it) in patients age 51-79 and  $\geq 80$  ( $p < 0.0001$ ,  $p = 0.0588$ , respectively). Older patients, who were offered chemotherapy (including both those who received and those who refused it), had improved survival over those who were not offered it ( $\leq 50$ :  $p = 0.2151$ , 51-79:  $p < 0.0001$ ,  $\geq 80$ :  $p = 0.0055$ ). After controlling for patient, disease, and treatment characteristics, greater age (51-79: HR 2.16,  $p < 0.001$ ,  $\geq 80$ : HR 4.90,  $p < 0.001$ ), coverage by Medicare (HR=1.60,  $p < 0.001$ ), greater comorbidities (HR 1.87,  $p < 0.001$ ), greater T stage (HR=2.05,  $p < 0.001$ ) and receipt of a total colectomy (HR 1.30,  $p = 0.003$ ) were associated with worse survival. Receipt of chemotherapy (HR 0.54,  $p < 0.001$ ) and refusal of chemotherapy (HR 0.65,  $p < 0.001$ ) were associated with improved survival compared to no chemotherapy.

**Conclusions/Discussion:** Age is inversely proportional to survival in stage II colon cancer. Chemotherapy is more frequently offered to patients under age 50, even in the absence of high-risk features and less frequently to patients over 80 that have high-risk features. Chemotherapy may be over-utilized in younger patients and underutilized in older patients, where it appears to have the biggest impact on survival.



### MID-TERM ONCOLOGIC OUTCOMES FOR SINGLE SITE LAPAROSCOPIC COLECTOMY ARE SIMILAR TO STANDARD LAPAROSCOPY.

P377

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**Purpose/Background:** Single site laparoscopic (SSL) and standard laparoscopic (SDL) approaches for colon and rectal surgery have similar operative outcomes; however, there is limited data on oncologic outcomes for SSL in colorectal cancer. This study investigates the mid-term oncologic outcome of patients who underwent SDL or SSL colon resections for colon cancer.

**Methods/Interventions:** A retrospective review of consecutive patients undergoing SSL or SDL segmental colon resections for colon cancer at a single institution between Jan 2009 and Jan 2014 were analyzed. Patient demographics, tumor characteristics and staging, and outcomes were analyzed. Overall survival (OS), disease-free survival (DFS) and disease-specific survival (DSS) were recorded at 3 years. Statistical analysis was performed using chi-square test for categorical variables, t-test for continuous variables, and log-rank test for Kaplan-Meier survival curves.

**Results/Outcome(s):** A total of 105 patients were included, of which 44 underwent SDL and 61 underwent SSL segmental colectomies. Median follow up time was 3.1 years (mean 44.5 months) with 3-year OS of 81% and DFS of 75%. There were no differences between SDL and SSL groups in patient demographics, operative time, or stoma creation. Post-surgical outcomes including readmissions, overall complications, individual complications of surgical site infection, leak, stricture, or hernia (incisional or parastomal) did not differ between SDL and SSL groups. The number of nodes harvested, microscopic margin, tumor grade, tumor size, nodal status, and presence of metastasis were similar between groups. Compared to SDL, overall, disease-free, and disease-specific survival rates were similar in patients undergoing SSL colectomies (SDL vs. SSL: OS: 85% vs. 75%;  $P = 0.254$ ; DFS: 67% vs. 82%;  $P = 0.064$ ; DSS: 84% vs. 93%;  $P = 0.150$ ).

**Conclusions/Discussion:** SSL colectomy is both safe and feasible in colon cancer, and SSL has equivalent short-term oncologic outcomes (margins, number of node harvested) compared to conventional laparoscopic resections. Furthermore, mid-term 3-year survival is comparable for patients undergoing SDL or SSL colectomy for colon cancer. Accordingly, SSL is a safe alternative to conventional laparoscopic surgery for colon cancer.

#### TRANSANAL TOTAL MESORECTAL EXCISION FORT4 RECTAL CANCERS.

P378

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**Purpose/Background:** Transanal total mesorectal excision (TaTME) has risen as a growing approach for rectal cancer. Its oncologic outcomes had been proven to be comparable to the gold standard, laparoscopic total

mesorectal excision. The use of minimally invasive techniques is still controversial for the management of locally advanced rectal cancer. The aim of this study was to analyze the outcomes of patients with preoperative T4 rectal cancer treated by TaTME.

**Methods/Interventions:** Patients with preoperative and pathological T4 were identified on a prospectively maintained database of patients undergoing TaTME with curative intent for rectal cancer in a tertiary referral center. Demographic, surgical and histopathological data, as well as oncological follow-up, were recorded.

**Results/Outcome(s):** Twenty-three patients with T4 cancers underwent TaTME out of the 248 cases recorded on the database, from October 2011 to October 2016. Median age was 65 years old (range 39-89) with 70% being males (n= 16). BMI was 25 Kg/m<sup>2</sup> (range 20-34). Average distance from the anal verge was 8.4 cm (3-15) with 52% on the mid rectum (n = 12), 34% on the high rectum (n=8) and 13% low (n=3). Neoadjuvant treatment was given on 61% of the patients. The remainder underwent surgery first due to height of the tumor or due to comorbidities.

#### P377 SDL vs. SSL Outcomes

Variable	SDL (n = 44)	SSL (n = 61)	P value
T stage, n (%)			0.377
1	16 (36%)	15 (25%)	
2	4 (9%)	9 (15%)	
3	18 (41%)	23 (38%)	
4	6 (14%)	14 (23%)	
N stage, n (%)			0.664
0	24 (55%)	35 (57%)	
1	11 (25%)	11 (18%)	
2	9 (20%)	15 (25%)	
M stage, n (%)			0.739
0	39 (89%)	56 (92%)	
1	5 (11%)	5 (8%)	
Tumor stage, n (%)			0.915
I	14 (32%)	18 (30%)	
II	9 (21%)	15 (25%)	
III	16 (36%)	23 (38%)	
IV	5 (11%)	5 (8%)	
Grade, n (%)			0.754
Low	38 (86%)	50 (82%)	
High	6 (14%)	11 (18%)	
Nodes harvested, mean ± SD	20.9 ± 11.9	24.6 ± 9.5	0.086
Macroscopic perforation, n (%)	2 (5%)	5 (8%)	0.696
Lymphovascular invasion, n (%)	15 (34%)	21 (34%)	0.972
Perineural invasion, n (%)	8 (18%)	9 (15%)	0.790
Tumor deposits present, n (%)	6 (14%)	11 (18%)	0.602
OR time, mean ± SD, min	190 ± 79	162 ± 72	0.700
Length of stay, mean ± SD, days	5.2 ± 2.2	4.6 ± 3.0	0.339
60-day readmission, n (%)	9 (21%)	4 (6%)	0.04
Post-op complications, n (%)	14 (32%)	12 (26%)	0.098

Seventy-nine percent of the anastomosis were mechanic. Hysterectomy was associated on one of the case with no other multivisceral resection required. Operative time average was 156 minutes (75-310). Time to discharge was 6.6 days (range 3-30). Complete mesorectum was found on 91% of the cases, with 26% presenting a positive CRM (<1mm). The average number of lymph nodes harvested was 15, with 6 cases (26%) being positive for node metastases. Anastomotic leak was found on 3 patients (13%), one of them requiring a terminal colostomy; additionally 2 patients presented a collection treated with percutaneous drainage and antibiotics. Postoperative treatment was given on 7 patients (30%). After excluding 2 patients with initial stage IV patients, locoregional recurrence occurred on 3 patients (13%), and systemic recurrence on 6 (26%) on the 15 months median follow-up. Disease free-survival was 65% and overall survival was 95%.

**Conclusions/Discussion:** TaTME is a safe and feasible technique even for the more locally advanced rectal cancers. This approach provided acceptable histopathological results with adequate oncological follow-up.

#### READMISSION AFTER OPEN VERSUS LAPAROSCOPIC LOW ANTERIOR RESECTION WITH DIVERTING ILEOSTOMY IN PATIENTS WITH ADVANCED RECTAL CANCER.

P379

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**Purpose/Background:** Laparoscopic surgery and ERAS protocols have significantly reduced length of stay after colorectal resections. Several studies demonstrated similar readmission rates after laparoscopic and open surgery, although these cohorts included both colon and rectal resections and did not differentiate between procedures or whether an ileostomy was created, which is a well-known risk factor for postoperative dehydration and re-admission. This study analyses readmissions after open versus laparoscopic low anterior resections (LAR) with diverting ileostomies in patients with neoadjuvantly treated rectal cancer in an era of ERAS.

**Methods/Interventions:** A retrospective analysis of a single center cohort, including all rectal cancer patients who received neoadjuvant treatment and underwent an LAR with diverting ileostomy between 2004-2014. Patients who were readmitted electively for a separate procedure were excluded. All patients were retrieved from an IRB-approved, prospectively maintained database.

**Results/Outcome(s):** The cohort consisted of 89 patients who had an open procedure and 40 patients (31.0%) who underwent a laparoscopic procedure. There were no significant differences in age, gender, BMI, comorbidity or ethnicity between the two groups. Median

operative duration was significantly longer in the open group (226 minutes vs. laparoscopic 124;  $P<0.001$ ). Median initial admission duration was 5 days in the open group, compared to 3 days in the laparoscopic group ( $P<0.001$ ). Readmission rates, however, were comparable (open 15.7% vs. lap 15%;  $P=0.916$ ). The mean number of days to readmission was significantly less in laparoscopically treated patients (7.2 days vs. open 13.5;  $P=0.033$ ). Despite being not statistically significant, reasons for readmission appeared to be different: more open treated patients presented with symptoms of dehydration at the time of readmission (57.1% vs. 33.3%;  $P=0.628$ ), while more laparoscopically treated patients presented with an abscess (50% vs. 14.3%;  $P=0.131$ ) or ileus/SBO (16.7% vs. 7.1%;  $P=0.521$ ). The length of readmission was similar for both groups (open 4 days vs. lap 3.5;  $P=0.659$ ).

**Conclusions/Discussion:** Patients who underwent laparoscopic LAR with a diverting ileostomy after neoadjuvant therapy had a shorter length of stay with similar readmission rates as those who underwent an open procedure. The time to readmission was significantly shorter in the laparoscopic group, which may be explained by the finding that reasons for readmission in the laparoscopically treated group tended to consist of intra-abdominal issues, while the open treated patients presented more often with dehydration.

#### SOX9 IN IRRADIATED RECTAL CANCER: A POTENTIAL MARKER FOR TUMOR REGRESSION?

P380

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**Purpose/Background:** Epithelial-mesenchymal transition (EMT) is a physiological process observed during development, wound healing and stem cell regulation; however it is a hallmark of cancer progression as well. Sex-determining Region Y box 9 (SOX9) has been shown both to play a fundamental role in EMT as well as be dysregulated in colorectal cancer. Its role in carcinogenesis remains controversial since SOX9 has been associated with both positive and negative prognostic factors in multiple cancers.

**Methods/Interventions:** 21 patients with locally advanced rectal cancer were included in the study. Sections from both normal and cancerous tissue of the same specimen were taken before and after treatment with chemoradiation. SOX9 expression was evaluated by immunohistochemistry performed on these sections using a 4-tier grading system for intensity of expression (0=none, 1=low, 2=moderate, 3=high) and percentage of SOX9-positive cells. Linear mixed model and repeat measures MANOVA was used to compare the % positivity and

differences in expression intensity between normal and cancerous tissue both pre- and post-treatment.

**Results/Outcome(s):** Both pre-treatment expression intensity and percent positivity of SOX9 was significantly higher in cancer tissue when compared to normal rectal tissue ( $p=0.0001$  and  $0.001$ , respectively). Before treatment, SOX9 expression intensity was at least moderate (grade=2 or more) in 52.9% of normal rectal tissue. After treatment, only 11.8% were considered to have moderate expression ( $p=0.07$ ). In cancer specimens, the pre-treatment expression intensity was graded as high in 90.0% of specimens, which then decreased to 35.0% post-radiation ( $p=0.0008$ ). In pre-treatment normal tissue, 20.1% cells expressed SOX9 which was then found to significantly decrease to 13.5% after chemoradiation ( $p=0.02$ ). In cancer sections, 91% of cells expressed SOX9 before radiation, which then decreased to 69.5% after treatment ( $p=0.004$ ).

**Conclusions/Discussion:** In our study, intensity of expression and percentage of SOX9+cells are higher in cancerous tissue when compared to the normal tissue of the same patient. SOX9 expression and percent positivity are also found to significantly decrease after treatment with chemoradiation, both in normal and cancerous tissue. Although its role remains controversial, our findings suggest that SOX9 may be an important key in both colorectal carcinogenesis and as maker and potential target for tumor regression after chemoradiation.

### METFORMIN INCREASES COMPLETE PATHOLOGIC RESPONSE AMONG DIABETICS WITH RECTAL CANCER.

P381

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**Purpose/Background:** Metformin, a common anti-diabetic drug, is associated with decreased incidence and improved survival in multiple types of cancer including prostate, breast, and pancreatic; and enhances radiosensitivity of cancer cells *in vivo* and *in vitro*. We hypothesized that metformin-using diabetics would demonstrate improved response to neoadjuvant chemoradiotherapy for locally-advanced rectal cancer compared to diabetics not using metformin.

**Methods/Interventions:** We retrospectively identified diabetic patients undergoing curative-intent resection for rectal cancer after neoadjuvant therapy at the University of Minnesota from 2010 through 2015. Clinical, operative, and pathologic reports were reviewed for pretreatment staging, neoadjuvant regimen, diabetic medications, and pathology results. Patients with metastatic disease, those undergoing resection without neoadjuvant therapy, and patients who underwent induction chemotherapy

were excluded. Diabetic status and medication use were identified via primary care provider and oncology notes. Metformin users were classified as those who took metformin at the time of diagnosis and throughout their neoadjuvant course. Non-users were metformin-naïve.

**Results/Outcome(s):** We identified 32 diabetic patients (9 [28%] women, mean age 65.5 years) who underwent resection for rectal cancer after neoadjuvant chemoradiotherapy in our study period. All patients received 5-fluorouracil or capecitabine-based chemotherapy in combination with 45-50Gy of radiotherapy. Two patients required decreased chemotherapy, but all completed radiation. Interval from completion of radiation was equivalent between metformin-users and non-users (81.2 versus 71.6 days,  $p=0.10$ ). Eighteen (56%) were receiving metformin. Metformin users were similar to non-users in terms of age, gender, and tumor stage and size (See Table 1). On final pathology, 72% of metformin-users and 71% of non-users had a lower T-stage than predicted on pre-treatment MRI or EUS ( $p=0.54$ ). Pathologic tumor regression grade was similar between the two groups. However, 6/18

**P381 Table One: Patient characteristics**

	Metformin	
	Users	Non-Users
N	18	14
Female	4	5
Age (years)	66.7	63.8
	Diabetic Medications	
Insulin	2	6
Glipizide	8	3
Other*	8	3
	Clinical T Stage	
T2	0	1
T3	13	9
T4	4	3
NS	1	1
Tumor Size (cm)	6.5	5.8
Interval (Days)	71.6	81.2
	Pathologic T Stage	
T0	6	2
T1	2	2
T2	5	3
T3	4	6
T4	0	0
NS	1	1
TRG		
0-1	7	6
2-3	5	4
CPR	6	2

Abbreviations: NS: Not stated. TRG: Tumor regression grade. CPR: Complete pathologic response. \*Includes alternate antihyperglycemics, diet and transplant.

(33%) of metformin users experienced a complete pathologic response as compared to 2/14 (14%) of non-users (p=0.41).

**Conclusions/Discussion:** There are few known predictive factors of complete pathologic response, thus research in this area is critical. Among diabetic patients undergoing neoadjuvant therapy and resection for rectal cancer, metformin use doubled the rate of complete pathologic response. Although limited by small sample size, these results merit further inquiry into the effect of metformin on response of rectal cancer to neoadjuvant chemoradiotherapy.

**TRANSANAL ENDOSCOPIC MICROSURGERY FOR T1 CANCER: DIFFERENT PREOPERATIVE DIAGNOSES LEAD TO SIMILAR POSTOPERATIVE CURE RATES**  
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P382

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**Purpose/Background:** Transanal Endoscopic Microsurgery (TEM) is the treatment of choice for large benign lesions and select early cancers in the rectum. Current evidence suggests early, favorable T1 rectal adenocarcinoma can be definitively treated with TEM. We compared disease-free survival after TEM between 3 groups: tumors with preop diagnosis of adenoma, but postop pathology diagnosis of T1 cancer (TEM-Ad), T1 malignant polyps removed endoscopically and subsequent TEM scar removal to ensure negative deep margin (TEM-Sc) and tumors known to be adenocarcinoma preop and confirmed T1 postop (TEM-Ca).

**Methods/Interventions:** At St. Paul's Hospital, demographic, operative, pathologic and follow up data is prospectively collected for all patients treated by TEM in the SPH TEM database. We evaluated patients in 3 subgroups (Ad, Sc, Ca) who had TEM for curative intent in a primary lesion, with minimum 6-month followup. Excluded were patients with synchronous bowel cancers, inflammatory processes, recurrent disease or procedure abandoned due to technical difficulties. ANOVA was used to compare preoperative characteristics and perioperative outcomes. Kaplan-Meier analysis was used to estimate disease-free survival.

**Results/Outcome(s):** Between March 2007 and March 2016, 134 patients underwent TEM resection for T1 cancer, of which 88 fulfilled inclusion/exclusion criteria: 30 TEM-Ad, 18 TEM-Sc and 40 TEM-Ca. The 3 groups

were similar in gender, tumor height, BMI, tumor location, and margin status (Table 1). TEM-Sc patients were significantly younger than the other 2 groups (67.7 vs. 59.5 vs. 67.4, p=0.033). Overall complication rate was 13.6% with no significant differences between the groups. Mean length of hospital stay was 0.42 (0-4) days, with 67 patients having outpatient surgery. Median follow up was 21 (6-106) months. Overall, there were 12/88 recurrences (13.6%), of which 2 were adenomas. Of the 10 patients who had adenocarcinoma recur, 9 patients had local recurrence alone, and 1 patient had both local disease and distant metastasis. Eight of these had radical resection with curative intent with no subsequent recurrences. In the entire group, there were 2 cancer-related deaths. There were no differences in recurrence between the 3 groups (10.0% vs. 12.5% vs. 11.1%, p=0.458).

**Conclusions/Discussion:** TEM resection of T1 rectal cancers is safe, with low complication rate and short hospital stay. Experienced surgeons can achieve high R0 resection rates with few local recurrences. Standard technique of full thickness excision and wide margin clearance is recommended; regardless whether the procedure is for suspected adenoma, scar after previous endoscopic excision or known T1 cancer.

	TEM-Sc	TEM-Ca	TEM-Ad	p-value
<b>Total (n)</b>	18	40	30	
<b>Age</b>	59.4 ± 9.5	67.4 ± 9.3	67.7 ± 9.0	0.033
<b>M</b>	10 (55.6)	25 (62.5)	22 (73.3)	0.437
<b>F</b>	8 (44.4)	15 (37.5)	8 (26.7)	
<b>BMI</b>	26.06 ± 5.3	26.4 ± 4.0	24.6 ± 4.46	0.208
<b>ASA</b>	2.33	2.23	2.3	0.845
<b>Tumour position:</b>				0.120
<b>Anterior</b>	10 (55.5)	13 (32.5)	8 (26.7)	
<b>Posterior</b>	6 (33.3)	20 (50.0)	14 (46.7)	
<b>Lateral</b>	2 (11.1)	7 (17.5)	8 (26.7)	
<b>Tumour Height (cm)</b>	6.53 ± 0.09	7.19 ± 2.23	6.73 ± 2.3	0.845
<b>Margin Status</b>				0.511
<b>R0</b>	17 (94.4)	37 (92.5)	25 (83.3)	
<b>R1-Ca</b>	1 (5.6)	2 (5.0)	4 (13.3)	
<b>R1-Adenoma</b>	0	1 (2.5)	1 (3.33)	

Table 1. Patient and tumour characteristics: data are presented as n (%) or mean ± SD

**MULTIVISCERAL RESECTION FOR LOCALLY ADVANCED COLON CARCINOMAS STAGE AJCC II AND AJCC III: SHORT- AND LONG-TERM ONCOLOGICAL OUTCOMES.**

P383

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**Purpose/Background:** Multivisceral resection for locally advanced colon cancer occurs frequently. However, little is known about the impact of these resections on short- and long-term outcomes. We aim to determine if local multivisceral resections, involving adherent or invasive tissue, impacts perioperative and long-term oncological outcomes.

**Methods/Interventions:** All patients who underwent surgical therapy for colon cancer at our tertiary center from



2004 to 2014 with AJCC stage II or III colon cancer were included. We analyzed patients with non-multivisceral resections (NMR) staged T3 versus local-multivisceral resections (LMR) staged T4 (n=557), all with R0 resection. We reviewed patient demographics, peri- and postoperative variables, and long-term oncological outcomes. Multivariable Cox regression adjusted for potential confounders were performed.

**Results/Outcome(s):** We included 322 AJCC II and 211 AJCC III patients. The majority of patients underwent a NMR (n=501); 60.9% stage II and 39.1% stage III. LMR (n=32) most commonly involved the abdominal wall (30.3%), small intestine (26.3%), ovaries and uterus (17.8%), and stomach (14.3%). The only demographic difference between both groups was BMI which was higher for stage II NMR patients (P<0.01). LMR patients were associated with a symptomatic presentation, open procedures, a longer length of stay, longer surgery duration, a higher need for blood transfusion (P<0.01), and more post-operative complications for stage II patients (P<0.05). Pathologically, LMR patients had a significantly larger tumor size and stage III LMR patients had more tumors positive for EMVI (P<0.01). Stage II LMR patients were associated with more post-operative chemotherapy (P<0.001). Median follow-up duration for both groups was comparable (AJCC II: NMR 51.2 vs. LMR 54.0 months, and AJCC III: 45.7 vs. 50.6 months). Post-admission and long-term oncological outcomes, as well as Kaplan Meier survival-curves for overall and disease free survival were not significantly different. For patients with stage II NMR, the Kaplan-Meier three-year survival was 86.7% versus 88.2% for LMR. Stage III NMR had a Kaplan-Meier three-year survival of 80.2% versus 70.7% for LMR. In multivariable Cox regression, the hazard ratio for survival adjusted for patient demographics was not significant in stage II (0.627 [95% CI: 0.15-2.61] P=0.521) nor in stage III patients (0.627 [95% CI: 0.15-2.61] P=0.521).

**Conclusions/Discussion:** LMR are associated with a significantly longer length of stay, surgery duration, and post-operative complications. However, 30-day morbidity and mortality rates and long-term oncological outcomes were comparable between NMR and LMR. Our study demonstrates that R0 local multivisceral resections are reasonable to perform and have comparable outcomes to those patients with T3 disease.

## DEFINITIVE STOMAS AND PREVENTION OF PARASTOMAL HERNIA AFTER ABDOMINO-PERINEAL RESECTION. TEXAS ENDOSURGERY INSTITUTE (TEI) EXPERIENCE.

P384

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**Purpose/Background: BACKGROUND:** A parastomal hernia is an incisional hernia related to a stoma. Parastomal hernias are among the most frustrating and incapacitating complications of permanent stomas. It is a complication that can be difficult to treat adequately and can lead to significant morbidity. The incidence of parastomal hernias is highest for colostomies and varies from 50% to 93% of stomas. Parastomal hernias develop within the first few years after construction of a stoma, but can occur up to 20 years afterwards. The aim of this study was to evaluate the safety and efficacy of prosthetic mesh in permanent stoma creation.

**Methods/Interventions:** A retrospective review of the medical records of all patients who had a prosthetic polypropylene mesh placed at the time of stoma creation in laparoscopic abdominoperineal resections for the prevention of a parastomal hernia at TEI

**Results/Outcome(s):** A prosthetic polypropylene mesh was used in 5 patients who underwent laparoscopic abdominoperineal resection to prevent the occurrence of a parastomal hernia. So far we haven't had any mesh-related or stoma complications, and no parastomal hernias have occurred

**Conclusions/Discussion:** This data shows the safety and efficacy of using a prosthetic mesh such as polypropylene at the time of permanent stoma creation. Mesh reinforcement demonstrates a trend toward a decreased incidence of parastomal herniation.

## DIFFERENCES IN PATIENT DEMOGRAPHICS AND CLINICAL OUTCOMES BETWEEN RIGHT VERSUS LEFT VERSUS TRANSVERSE COLECTOMY FOR COLON CANCER.

P385

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**Purpose/Background:** Many studies are focused on optimization of surgical outcomes after colectomy, but most studies cluster all colectomies together. Right-sided colectomy (RC) is often believed to be a procedure with less risk and better outcomes than a left-sided colectomy (LC), but most studies don't distinguish between right-sided, left-sided and transverse colectomies. The aim of our study was to determine whether patient demographics and long-term oncological outcomes differed between these procedures for patients with colon cancer.

**Methods/Interventions:** All patients who underwent surgical therapy for colon cancer at our tertiary center from 2004 to 2014 were included. We analyzed all patients who underwent right-sided, left-sided or transverse colectomy (n=1371). Patient demographics and short- and long-term oncological outcomes were. Multivariable AJCC stage-adjusted Hazard ratios (HRs) were used to assess long-term survival outcomes.

**Results/Outcome(s):** LC patients (n=542) were younger, more often male and presented more often symptomatically (P<0.001). They had a lower comorbidity-score and received more pre-operative radiation due to baseline metastasis or locally advanced colon cancer (P<0.05). LC patients had more R0 resections (P<0.001) and immunohistochemical staining patterns demonstrated less hMLH1 and hPMS2 loss (P<0.01). During follow-up, LC patients had higher rates of lung and liver metastasis (P<0.05), for which they received more postoperative chemotherapy (P<0.001). RC patients (n=772) had a higher ASA-score (mean 2.45 vs. 2.31 for LC; P<0.001). They had more radial margin involvement, microsatellite instability, and more invasive and transmural peritumoral lymphocyte response (P<0.01). TC patients (n=57) had less N+ disease (P<0.01), and more stage 0 and II disease (P<0.01). Long-term follow-up shows a longer median overall survival for TC (48.6 months vs. 42.1 for RC and 40.8 for LC), however this was not significant. Mortality rates (P=0.127), duration of survival (P=0.631), and disease-free survival (P=0.282) were not substantially different. Adjusted cox regression showed no significant difference in mortality between RC, LC, and TC for all stages combined (HR = 1.02 (95% CI: 0.77-1.35; P=0.908). However, Kaplan-Meier survival estimates for stage IV TC patients had a significantly shorter median survival in comparison to the other groups (20.6 months vs. RC 30.9 months vs. LC 40.7 months; P<0.01).

**Conclusions/Discussion:** This study highlights the differences in patient demographics, and pathology outcomes for right-sided, left-sided, and transverse colectomies for colon cancer. Despite the fact that LC and RC patients had more poor prognostic factors, high staged TC patients had the least favorable long-term outcome.

#### PATIENTS WITH DISTAL RECTAL CANCER: OUTCOMES TO CHOOSE TREATMENT STRATEGY FOR PATIENTS WITH LOW RECTAL CANCER.

P386

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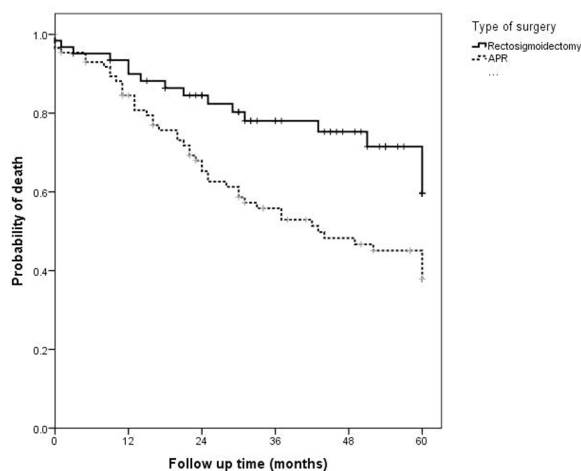
**Purpose/Background:** During the last decades much effort has been made to increase sphincter-saving procedures the treatment low rectal cancer. The aim of this

study was to analyze the results of surgical management of patients with distal rectal cancer in a ten year period and identify the outcomes and prognostic factors.

**Methods/Interventions:** Patients with advanced low rectal cancer operated with preserving or non-preserving techniques between 2002 and 2012 were retrospectively evaluated based in a prospective database of patients and included in the study. The following factors were analyzed and related to five-year survival and recurrence: age, gender, tumor location, number of lymph nodes obtained lymph node involvement at the surgical specimen, rectal wall involvement and distant metastases. Patients with peritoneal carcinomatosis or advanced distant metastases were excluded.

**Results/Outcome(s):** Out of 928 patients who underwent surgery for colorectal cancer, 171 (18%) were located in the lower rectum (0-7 cm from the anal verge). 23 patients (2%) had peritoneal carcinomatosis or distant metastasis and the remaining 148 patients were included in the study. There were 78 female patients (52.7%) and age stratification showed 11 (7.4%) patients with less than 40 years old, 68 (52.7%) between 41 and 60 and 69 (46.6%) older than 60 years old. Neoadjuvant chemoradiation therapy was performed in 86.5% of patients APR in 86 patients and sphincter preserving surgery with LAR in 62 patients. Regarding rectal wall staging 34 patients (23%) were T2, 77 (52%) were T3 and 15 (10%) were T4. Lymph node involvement was observed in 41 patients (27.7%). In univariate analysis neoadjuvant chemotherapy and age<40 years were associated with higher local recurrence. However, multivariate analysis only poorly differentiated tumors (p=0.026) and abdominal perineal resection (p=0.009) were correlated with higher recurrence rates. The median follow-up time was 32 months (16 to 59.9). Overall 5-year survival was 58.1%. The stratification by type of surgery identified poorer 5-year survival in abdominal perineal resection (46.5%) as compared to low anterior resection (74.2%). Also at the univariate analysis, advanced T stage (T3 and T4), lymph node involvement and poorly differentiated tumors had a lower survival (p<0.05).

**Conclusions/Discussion:** Abdominal-perineal resection seems to be a worse treatment regarding recurrence and long term survival as compared to sphincter preservation surgery for distal rectal cancer. Obviously, advanced T and N stages and poor tumor differentiation are associated with worse survival. Sphincter-preserving could be an option for the treatment of locally advanced lower rectal cancer when this treatment can be performed.



**Figure 1.** Kaplan-Meier survival estimates for patients with low rectal cancer according to type of surgery

### ROBOT-ASSISTED TOTAL MESORECTAL EXCISION FOR RECTAL CANCER: COMPARISON OF SHORT-TERM SURGICAL AND FUNCTIONAL OUTCOMES BETWEEN THE DA VINCI XI AND SI.

P387

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**Purpose/Background:** Robotic rectal resection with the Da Vinci Si has been associated with low conversion rate, shorter learning curve and good functional outcomes. Nevertheless, the fixed position of the patient after docking and instrument collisions, represent some of its main drawbacks that could be overcome by the new Da Vinci Xi. The aim of this study is to compare surgical outcomes and postoperative autonomic function of robotic rectal resection with Total Mesorectal Excision (TME) for cancer, with the use of the new da Vinci Xi (Xi-RobTME group) and the da Vinci Si (Si-RobTME group), in a single surgeon experience.

**Methods/Interventions:** The first consecutive 30 Xi-RobTME were compared with a case-matched Si-RobTME group, selected within our Institute database, comprising all cases performed between April 2010 and September 2016 by a single surgeon. Perioperative outcomes, prospectively collected in a dedicated database, were compared. The impact of minimally invasive TME on autonomic function and quality of life (QOL) was analyzed with ICIQ-FLUTS and ICIQ-MLUTS (International Consultation on Incontinence–Female/Male Lower Urinary Tract Symptoms) and IIEF (International Index of Erectile Function)/FSFI (Female Sexual Function Index) questionnaires.

**Results/Outcome(s):** The docking and overall operative time were shorter in the Xi-RobTME group (23.5 min vs 17.5 min and 285 min vs 318 min,  $p < 0.001$  and  $p < 0.05$  respectively). A fully robotic approach with complete splenic flexure mobilization (SFM) was used in 30/30 (100%) of the Xi-RobTME cases and in 7/30 (23%) of the Si-RobTME group ( $p < 0.001$ ). In the Si-RobTME group, a hybrid approach with complete SFM was used in 12/30 cases (40%), while a fully-robotic approach was used in 18/30 cases (60%), of which 11 with partial SFM. Ten of the 12 cases (83%) of Si-RobTME hybrid subgroup were males and the mean BMI was 25.1. The hybrid approach in males and patients with BMI > 25 was necessary in 10 patients (45% vs 0%,  $p < 0.001$ ) and in 6 patients (37% vs 0%,  $p < 0.05$ ), respectively between Si-RobTME and Xi-RobTME groups. There were no differences in terms of conversion rate, mean hospital stay and pathological results (number of harvest lymph nodes, quality of mesorectum, distal margin) and in sexual and urinary scores between the two groups before and at 1 year after surgery.

**Conclusions/Discussion:** The technical advantages offered by the new Da Vinci Xi seem to be mainly associated with a shorter docking and operative time and with superior ability to perform a fully robotic approach, even in difficult patients such as male and obese. Conversion rate, pathologic and functional outcomes seems not to be improved, with the introduction of the new Xi platform.

### THE IMPACT OF FORMAL ROBOTIC TRAINING ON THE UTILIZATION OF MINIMALLY INVASIVE SURGERY (MIS) BY YOUNG COLORECTAL SURGEONS.

P388

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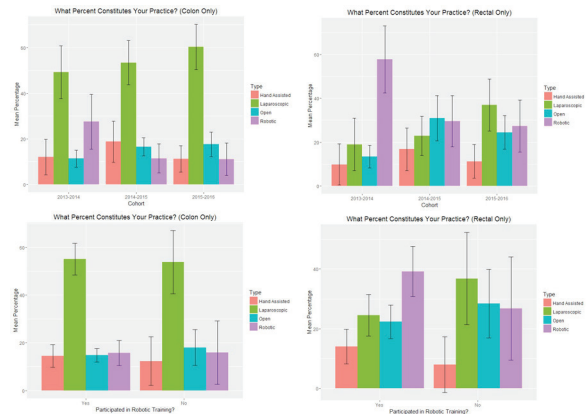
**Purpose/Background:** After 25 years, the minimally invasive approach to colorectal surgery is still underutilized. Only 55% of colectomies and 10-20% of rectal resections for cancer are performed laparoscopically. The increasing adoption of the robotic platform for colorectal surgery warrants a re-evaluation of MIS training techniques. While considering lessons learned from past laparoscopic training, a standardized national robotic training program for Colon and Rectal Surgery residents (fellows) was developed and implemented in 2011. The purpose of this study was to assess the impact of this program on the utilization of MIS in practice following fellowship training.

**Methods/Interventions:** An internet-based 18 question survey was sent to all colon and rectal surgeons who graduated from ACGME approved colon and rectal surgery residencies from 2014 to 2016. The last training year included an advanced cadaver course, quarterly webinars, case by case standardized operative evaluations, and anonymous

video review of unedited robotic cases. Grouped bar charts with error bars are presented along with summary statistics to offer a descriptive overview of training experiences by cohort.

**Results/Outcome(s):** The overall survey response rate was 43% (126 of 293). Most (80.2%) of the colon and rectal surgery residents participated in the formal robotic training course. 84% of colectomy cases done after fellowship training by course participants and nonparticipants were by the MIS approach (63.5% laparoscopic, 17.6% hand-assisted laparoscopic (HAL), 19.0% robotic). 74.8% of rectal resections were by the MIS approach (36.3% laparoscopic, 18.0% HAL, 45.7% robotic). Fifty percent of graduates pursued further robotic training after residency regardless of whether or not they participated in the fellowship training course. 86.1% of respondents had access to a robot while 60.8% reported having performed at least one robotic procedure. The most common barrier to conducting robotic surgery was a preference for the laparoscopic approach. The second most common barrier was inadequate robotic training. 74.3% reported having appropriate bedside assistance for robotic surgery in practice and 61.5% had a skilled partner to mentor them. For those implementing the robotic approach after fellowship, a mean of 4.4 months elapsed prior to performing the first case and a mean of 17.6 months prior to the 50th case.

**Conclusions/Discussion:** The utilization of minimally invasive surgery by young recently fellowship-trained colorectal surgeons is higher than previously reported. The proportion of rectal cases done robotically is higher compared to colon cases suggesting selective utilization of robotic surgery for more challenging cases in the pelvis. Methods to more effectively increase the utilization of minimally invasive approaches in colorectal surgery warrant further evaluation.



P387

Parameter:	Si-RobTME group	Xi-RobTME group	p Value
Mean age (range)	67.4±10.8 (44-83)	67.2±10.5 (38-86)	ns
Males	22 (73.3%)	22 (77.3%)	ns
Females	8 (22.7%)	8 (22.7%)	ns
Mean BMI Kg/m2 (range)	24.4±3.4 (17.6-30.5)	24.9±3.5 (18.9-35.5)	ns
ASA score I	0 (0%)	1 (3.3%)	ns
ASA score II	15 (50%)	16 (53.4%)	ns
ASA score III	15 (50%)	13 (43.3%)	ns
Surgical procedure: Anterior resection	22 (73.3%)	22 (73.3%)	ns
Intersphincteric resection	6 (20%)	6 (20%)	ns
Abdominoperineal resection	2 (6.7%)	2 (6.7%)	ns
Neoadjuvant radio-chemotherapy	15 (50%)	12 (40%)	ns
Mean docking time (min)	23.5±2.7 (20-30)	17.5±3.4 (15-25)	p<0.001
Mean operative time (min)	318±57 (215-480)	285±49 (200-395)	p<0.05
Conversion to open approach	1 (3.3%)	1 (3.3%)	ns
Full robotic approach	18 (60%)	30 (100%)	p<0.001
Complete SFM in full rob approach	7 (38.8%)	30 (100%)	p<0.001
Mean distance from anal verge (cm)	7.1±4.1 (0.5-18)	6.4±4.3 (1.5-15)	ns
Distal resection margin (cm)	2.3±1.1 (0.2-4)	2.2±1.2 (0.2-4.2)	ns
Lymph nodes	17.0±6.7 (5-31)	16.6±8.0 (5-30)	ns
Mean length of hospital (days)	11.5±7.0 (5-33)	9.8±6.5 (5-32)	ns
Overall complications	8 (26.7%)	6 (20%)	ns
Reintervention	0	1	ns
mortality	0	0	ns

## MOLECULAR PREDICTORS OF RESPONSE TO NEOADJUVANT CHEMORADIATION IN RECTAL CANCER: A SINGLE INSTITUTION STUDY.

P400

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**Purpose/Background:** Neoadjuvant chemoradiotherapy (CRT) has become an important part in the management of locally advanced rectal cancer. However, response rates are variable and novel tools for better patient selection are increasingly sought. Our aim was to assess the predictive value of previously suggested biomarkers (Cyclooxygenase-2 [COX-2], CD 133, and Ki-67) and to identify new predictive biomarkers for neoadjuvant CRT in rectal cancer.

**Methods/Interventions:** Twenty-four patients with rectal cancer were included in this retrospective case-control study. Two pathologists confirmed the diagnosis of rectal cancer using slides from each patient's pre-treatment biopsy. The patients were then divided into groups based on response to chemoradiation. Pre-treatment slides underwent immunohistochemistry (IHC) staining and scoring using a 4-tiered IHC score. Twenty-three samples also underwent gene expression analysis using the Nanostring® PanCancer Pathways for Human gene panel. Fold score t-tests were used to compare gene expression between groups and a multi-parameter neural network prediction model was developed. The network training set and the in-training testing set contained data of 6 patients each; and the final validation set for assessing the network contained data of 11 patients.

**Results/Outcome(s):** Each response group (low vs. high-responder) included 12 patients. Cox-2 and Cox-2 & Ki-67 interaction scores were found to be significantly higher in the high-responder group ( $P=0.033$  and  $P=0.014$  respectively). Gene expression analysis identified 24 genes as significantly up/down regulated between responder groups including: TGFB2, MGMT, CDC25B and MAD2L2 (See Figure 1). A predictive model using a computerized neural network relying on the 24 identified genes and the combined Cox-2 & Ki-67 level successfully predicted patients' response to therapy with 100% accuracy for both in-training testing and for post-hoc validation. Relative importance analysis of each factor network revealed expression of TGFB2, MGMT, CDC25B, MAD2L2 and the Cox2+Ki67 IHC score to account for approximately 50% of the network's power.

**Conclusions/Discussion:** Tissue gene expression patterns and IHC scores of Cyclooxygenase-2 and Ki-67 may be considered as biomarkers in predication of neoadjuvant CRT response in rectal cancer. Several novel genetic predictive biomarkers have also been identified,

though future prospective trials are needed to validate these findings.

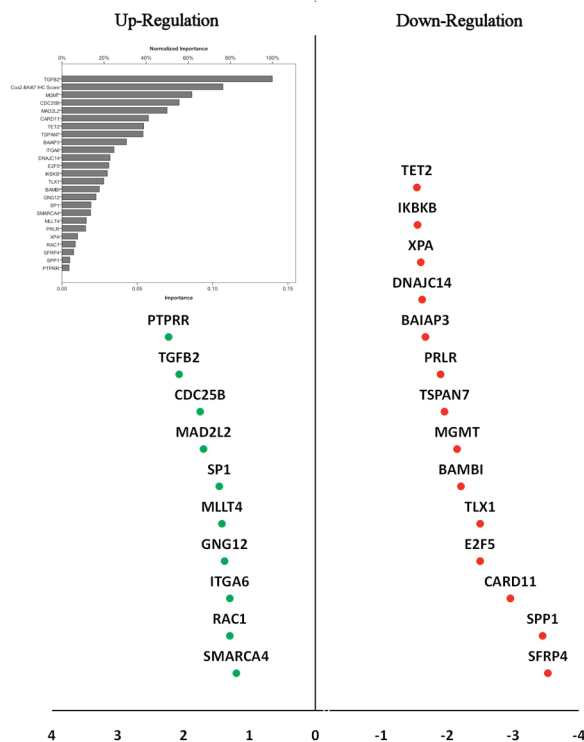


Figure 1. Significant Gene expression variation in high responders to chemoradiotherapy compared low responders ( $P<0.05$ ). In small panel, neural-network modeling of CRT response. Bars show relative importance of each factor.

## DIFFERENTIAL CLINICAL BENEFITS OF ADJUVANT CHEMOTHERAPY IN PATIENTS WITH STAGE III COLORECTAL CANCER ACCORDING TO TUMOR BUDDING STATUS.

P401

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**Purpose/Background:** Tumor budding has increasingly been paid attention as a marker of epithelial-mesenchymal transition (EMT) in colorectal cancer (CRC). The ability of cancer cells with EMT to resist chemotherapy is highlighted in basic researches; however, whether the grade of tumor budding can be associated with chemoresistance remains unclear. We aimed to determine the relationship between prognostic benefits of adjuvant chemotherapy in Stage III CRC and tumor budding status.

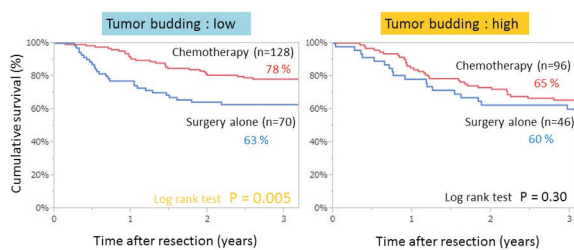
**Methods/Interventions:** We analyzed two data sets of Stage III CRC patients with curatively-intended surgery between 1999 and 2005 (first cohort,  $N=218$ ) and between 2006 and 2012 (second cohort,  $N=338$ ). In the first cohort, 139 received 5-fluorouracil-based adjuvant chemotherapy (chemotherapy group) and 79 did not

(surgery-alone group). In the second cohort, the number of patients in the chemotherapy and surgery-alone groups was 222 and 116, respectively. We classified the intensity of tumor budding (isolated single cancer cells or clusters of fewer than five cancer cells) as low grade (the number of bud in a x200 microscopic field at the hot spot, <10) or high grade ( $\geq 10$ ). We evaluated the benefits of adjuvant chemotherapy according to the grade of tumor budding.

**Results/Outcome(s):** In the first cohort, comparison of 3-year relapse-free survival (RFS) between the chemotherapy and surgery-alone groups revealed a significant survival benefit of adjuvant chemotherapy in budding-low patients (88.7% and 66.1%, respectively;  $P=0.001$ ), but not in budding-high patients (53.1% and 50.0%, respectively;  $P=0.83$ ). In the second cohort, similarly, 3-year RFS in the chemotherapy group was better than that in the surgery alone group in budding-low patients (78.2% and 62.9%, respectively;  $P=0.005$ ), but there was no such difference in budding-high patients (65.3% and 60.1%, respectively;  $P=0.30$ ).

**Conclusions/Discussion:** CRC patients with low-grade budding experienced significant survival benefits from adjuvant chemotherapy, but our studies indicated that tumors with a feature of high-grade budding might have a relatively strong chemoresistance. Future attempts to clarify the efficacy of modern chemotherapy regimens will be necessary.

#### Relapse-free survival in the second cohort



#### EFFECT OF DAIKENCHUTO ON THE ANASTOMOTIC HEALING AFTER RECTAL SURGERY IN A RAT MODEL.

P402

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**Purpose/Background:** Daikenchuto (DKT) is a traditional Japanese medicine and a mixture of extract powders from dried Japanese pepper, ginger, ginseng radix, and maltose powder. The major functions of DKT are improvement of intestinal movement, increasing colonic blood flow and anti-inflammatory function. Anastomotic leakage (AL) is a major complication and AL rate after rectal surgery still remains high. The purpose of this research is to investigate whether DKT can reduce postoperative AL in a rat model.

**Methods/Interventions:** We established an ischemic colonic anastomosis model with 8 weeks-old Wister rats. Intestinal blood flow was evaluated using ICG fluorescence imaging system, PDEneo (Hamamatsu Photonics). Luminance analyze software (ROIs) was used to measure fluorescence quantitation. We investigated 4 parameters of ICG fluorescence; 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) 4) Slope (Fmax/Tmax). Regarding the anastomotic healing and effects of DKT, we investigated the bursting pressure, AL rate, histopathological evaluation and mRNA expression of inflammatory mediators (TNF $\alpha$ , IL6, IL1 $\beta$ , VEGF $\alpha$ ) on postoperative day (POD) 2 and 5. We compared the each assessment between DKT group and Control group.

**Results/Outcome(s):** Regarding the intestinal blood flow, each parameter in DKT group vs. Control group was 1) Fmax:  $69.8 \pm 24.2$  vs.  $44.1 \pm 13.5$  ( $p=0.001$ ), 2) T1/2:  $42.8 \pm 33.3$  vs.  $61.6 \pm 38.8$  (n.s.), 3) Tmax:  $179.2 \pm 71.6$  vs.  $176.6 \pm 65.4$  (n.s.), and 4) Slope:  $0.47 \pm 0.31$  vs.  $0.28 \pm 0.13$  ( $p=0.03$ ). Bursting pressure of DKT group was significantly higher than that of Control group on POD5 ( $129.1 \pm 32.6$  vs.  $80.7 \pm 48.3$  (mmHg);  $p=0.04$ ), although not significantly different on POD2 ( $26.7 \pm 16.8$  vs.  $12.5 \pm 12.56$  (mmHg); n.s.). AL rate of DKT group was 7.7% (1/13), whereas that of Control group was 29.4% (5/17) ( $p=0.12$ ). Histopathological evaluation revealed that the granulation thickness of the anastomotic site was significantly larger in DKT group than in Control group on POD5 ( $1633.3 \pm 194.6$  vs.  $1025 \pm 150.7$  ( $\mu\text{m}$ );  $p=0.02$ ), although not significant on POD2 ( $454.4 \pm 35.2$  vs.  $433.9 \pm 35.2$  ( $\mu\text{m}$ ); n.s.). The number of newly formed blood vessels was significantly higher in DKT group than in Control group on POD5 ( $2.6 \pm 0.24$  vs.  $3.8 \pm 0.3$  (vessels/mm $^2$ );  $p=0.005$ ), although not significant at POD2 ( $1.1 \pm 0.19$  vs.  $1.1 \pm 0.2$  (vessels/mm $^2$ ); n.s.). In mRNA levels, IL6 and IL1 $\beta$  tended to be down-regulated in DKT group (IL6,  $p=0.17$ ; IL1 $\beta$ ,  $p=0.42$ ), while VEGF $\alpha$  on POD5 tended to up-regulated in DKT group ( $p=0.12$ ).

**Conclusions/Discussion:** Fmax and Slope of DKT group were significantly higher than those of Control group. The AL rate of DKT group tended to be lower than that of Control group. Bursting pressure of DKT group was significantly higher than Control group on POD5. Histological healing of DKT group was facilitated than Control group on POD5. DKT may reduce postoperative AL by increasing colonic blood flow and facilitating wound healing.

## OVERCOMING KRAS MUTANT COLON CANCER: CELLINE AND XENOGRRAFT STUDY.

P403

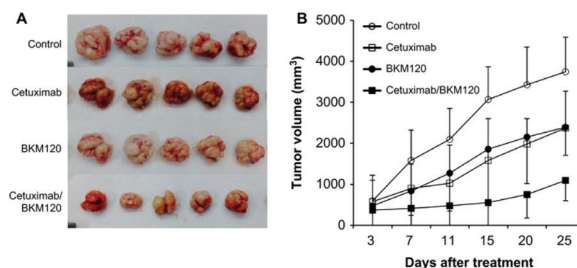
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**Purpose/Background:** Colon cancer is the third most commonly diagnosed cancer in the world, and exhibits heterogeneous characteristics in terms of genomic alterations, expression signature and drug responsiveness. In this study, we characterized the *PI3KCA* and *KRAS* mutational status of several human colon cancer cell lines. We then examined the therapeutic effects of BKM120 in combination with cetuximab in these cell lines both in vitro and in a xenograft model of this malignancy.

**Methods/Interventions:** To understand the importance of PI3K signaling in *KRAS* mutated colon cancer, we selected human colon cell lines based on mutation status of *KRAS* and *PI3K* genes. We assessed whether phosphorylation of ERK or AKT were changed after treatment with BKM120, cetuximab, or both for 1 hour. To address the inhibitory mechanism of BKM120 and cetuximab on tumor growth, we examined the activation of caspase 3 using colorimetric assay. In xenograft study, Male BALB/c nude mice, 4–6 weeks old, were obtained from Orient Bio, Inc (Seongnam, Korea). Mice were implanted subcutaneously with  $1.0 \times 10^7$  LoVo cells in Matrigel (Becton Dickinson Franklin Lakes, NJ). Tumors were allowed to grow to a size of 300–500 mm<sup>3</sup>, and animals were then randomly distributed to 4 groups for treatment and control.

**Results/Outcome(s):** Human colon cell lines with *KRAS* mutations (DLD1, HCT116, and LoVo) were used to test the effect of cetuximab, BKM120, and cetuximab plus BKM120 on cell proliferation in vitro and in vivo. BKM120 reduced cell proliferation in a concentration dependent manner in the LoVo (*PI3KCA* wild type) as well as the HCT116 and DLD1 cells (that carry a *PI3KCA* mutation). BKM120 only inhibited ERK phosphorylation in LoVo cells (*PI3KCA* wild type), but not in DLD1 or HCT116 cells at a concentration of 1  $\mu$ mol/L. Treatment with cetuximab and BKM120 significantly reduced the growth of xenograft tumors originating from *KRAS* mutant cells compared with cetuximab alone ( $P = 0.034$ ) (Figure).

**Conclusions/Discussion:** We demonstrated that BKM120 can increase the efficacy of cetuximab in *PI3KCA* wild type, *KRAS* mutant colon cancer by inducing apoptosis.



## INDOCYANINE GREEN QUANTIFICATION OF TISSUE VASCULARIZATION USING THE SERGREEN SOFTWARE IN AN EXPERIMENTAL STUDY.

P404

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**Purpose/Background:** Fluorescence by indocyanine green (ICG) can provide a useful subjective assessment of tissue vascularisation, but at present there is no objective method. Our group has designed a computer program, SERGREEN, to objectify ICG images of tissue vascularisation. In this study, we present the SERGREEN program and describe the first stage of its evaluation. In this first evaluation, an experimental study was designed in which the intraabdominal pressure (IAP) was manipulated to cause modifications in ICG saturation. We tested the ability of SERGREEN to identify these alterations.

**Methods/Interventions:** Experimental study, using 8 pigs between 25 and 30 Kg. It was approved by our local Committee on Animal Research and Ethics (CARE). The animals were anesthetized in accordance with our center's experimental protocol and hemodynamic parameters (arterial tension, heart rate and O<sub>2</sub> saturation) were controlled. We studied 5 different bowel segments, small bowel, cecum, right and left colon and the rectum. We established 5 different IAP measures at different time points: 10, 12, 15, 20 and 30 mmHg, at 30 minute intervals to ensure that ICG has been eliminated from the vascular circulation. ICG was administered in bolus at doses of 0.2 mg/Kg via the peripheral vein. The entire procedure was recorded and a picture was taken of every segment at each pressure in three different light modes: normal, SPIES mode Spectra A, and ICG. Each picture was analyzed in each mode by colorectal surgeons at our Hospital and graded based on an analog scale to evaluate the ICG. The ICG mode was processed by the SERGREEN software to obtain statistical parameters (mean, median, standard deviation and interquartile range), a boxplot and a histogram for each pixel in the area of interest. SERGREEN studies the absolute value of green saturation. This value ranges from 0 to a maximum of 255 points. With the pressure at

30 mmHg we extracted samples of the left and right colon and preserved them in formaldehyde for pathology study.

**Results/Outcome(s):** The normal values of saturations depended on the segment under study. The values differ according to bowel segment; most of them were around 80 - 120 points. Small bowel had the maximum saturation levels and achieved the maximum score (255). There did not appear to be significant differences in ICG saturation at different IAP measures, nor any pathological changes of ischemia in the pieces extracted at 30 mmHg.

**Conclusions/Discussion:** The image that we need is obtained easily and almost immediately after the administration of ICG, and the SERGREEN program quantifies the fluorescence effectively in relation to the vascularization. Its application may allow us to correlate the numerical scores produced with the evolution of bowel tissue (i.e., healthy or ischemic).

#### OPTIMIZED ANIMAL MODEL FOR COLORECTAL CANCER LIVER METASTASIS.

P405

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**Purpose/Background:** Liver metastasis is the main cause of death in colorectal cancer (CRC). An optimized animal model for liver metastasis in CRC is highly valuable because it would allow for testing of therapeutics in vivo. The aim of this study was to establish an optimized mouse model that has higher metastatic rates and maintains metastasis-related gene expression.

**Methods/Interventions:** Athymic nude mice ( $n = 30$ ) were divided into two equal groups: the splenic injection model (SIM) and surgical orthotopic implantation model (SOIM). In SIM mice, tumors were established by an intrasplenic injection of  $2 \times 10^6$  HCT-116 cells. In SOIM mice, tumor fragments from HCT-116 xenografts were implanted into the inner walls of the cecum of otherwise healthy mice. CRC metastasis was confirmed by gross and microscopic examinations. Metastasis-associated in colon cancer-1 (MACC-1) gene expression in colon cancer cell lines and metastatic tumors with a high metastatic rate was confirmed using quantitative reverse transcriptase polymerase chain reaction and immunohistochemistry.

**Results/Outcome(s):** The rate of local implantation was 78.6% ( $n = 11$ ) in SIM mice and 92.9% ( $n = 13$ ) in SOIM mice ( $P = 0.596$ ). The rate of liver metastasis was significantly higher in SIM mice than in SOIM mice (SIM: 90.9%,  $n = 10/11$  and SOIM: 46.2%,  $n = 6/13$ ,  $P$  value = 0.033). MACC-1 was expressed in Colo201, HCT-116, SW620, WiDr, and HT29 cells but not in SW480 cells. In SIM mice, MACC-1 gene expression was high in all metastatic tumors.

**Conclusions/Discussion:** SIM mice had higher liver metastatic rates than SOIM mice, and conserved MACC-1

expression originated from primary cancer cells. SIM appears to be an optimized animal model that reflects hematogenous metastasis.

#### HISTOPATHOLOGY OF ANAL FISTULAS: HEALERS LOOK DIFFERENT THAN NON-HEALERS.

P406

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**Purpose/Background:** The pathogenesis behind non-healing anal fistulas (NHAF) is not well understood. The aim of the current study was to see if histopathologic analysis of anal fistula tissue samples could be predictive of non-healing.

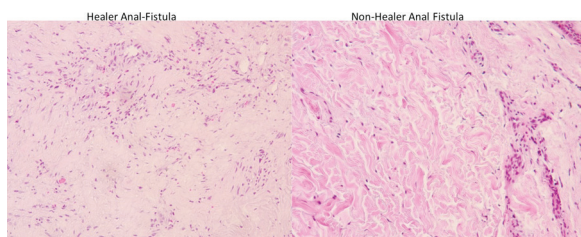
**Methods/Interventions:** A prospective pilot study was performed at a single institution beginning in October 2015 enrolling patients who were undergoing surgery to treat their anal fistulas. All patients were required to have a draining seton in place prior to enrollment. Patients with inflammatory bowel disease or who underwent fistulotomy were excluded. At the time of each fistula operation, fistula tissue from the external opening was collected for this research. The tissue was processed, stained with hematoxylin and eosin, and examined by a single, blinded pathologist. The degree of vascularity, fibrosis, granulocytosis, and lymphocytosis was graded on a scale from 0-3. Patients who developed fistula recurrence after sphincter-sparing repair or who developed recurrent or persistent infections or abscess cavities despite draining seton placement were considered non-healers. The relationship between fistula healing and histopathology recorded was analyzed.

**Results/Outcome(s):** Nine patients who underwent 12 operations (six sphincter-sparing repair, six replacement of setons) to treat their fistulas were enrolled in the study to date. Patients were followed for a median time of 5 (range, 2-11) months. Postoperatively, 4 fistulas (33%) failed to heal and the remaining 8 (67%) healed. Histopathologic analysis revealed that NHAF tissue contained dense bundles of collagen similarly to healed anal-fistula (HAF) tissue, but the former were more disorganized (NHAF: 2-3 grade versus; HAF: 0-1) and showed more tangles compared to healed fistula sites (NHAF: 2-3 grade versus; HAF: 0-1). Chronic inflammatory cells, namely lymphocytes and macrophages, predominated in both healed and non-healed fistula tissue (NHAF: 2-3 grade; versus; HAF: 2-3 grade). However, innate, acute inflammatory derived eosinophils were identified more frequently in NHAF (2-3 grade) versus HAF (1-2 grade). Moreover, inflammatory cells were more evenly distributed and lacked organization and localization in HAF (1-3 grade) in comparison to NHAF in which inflammatory nests were noted (0-1 grade). In NHAF, we also identified increased numbers of



endothelial lined vascular spaces (2-3 grade) and in some sections we observed polymorphonuclear leukocytes (1-2 grade).

**Conclusions/Discussion:** Descriptive histopathologic assessment of anal fistula tissue demonstrated differences in collagen organization and immune cell distribution and density between NHAFs and HAFs. Future directions of this project include further characterization of these differences through macrophage differentiation and specific cytokine profiles so that a better understanding of the pathogenesis behind NHAF can be established. This may lead to novel therapeutic options for the treatment of anal fistulas.



**Figure:** Examples of healing and non-healing anal fistula tissue at 20x magnification.

#### A DIGITAL COLLABORATIVE COMMUNITY: CONNECTING #COLORECTALSURGERY ON TWITTER.

P407

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**Purpose/Background:** The utilization of social media platforms amongst healthcare professionals is increasing. A Twitter social media campaign promoting the hashtag “#colorectalsurgery” was launched with the aim of providing a specialty-specific forum to collate discussions and science relevant to an engaged, global community of coloproctologists. Here, we review our initial experiences of the early adoption, engagement and utilization of this pilot initiative.

**Methods/Interventions:** The hashtag #colorectalsurgery was promoted via the online microblogging service Twitter across a 30-week period. Data on all ‘tweets’ containing the #colorectalsurgery hashtag were analyzed using online analytic tools, symplur.com and Creation Pinpoint. Data included total number of tweets, number of views, and user engagement since registration and launch of the campaign. Further, content of tweet and user demographic analysis was undertaken.

**Results/Outcome(s):** The number of tweets using #colorectalsurgery grew rapidly during the 30-week study period following the launch on 24th April 2016.

#colorectalsurgery was used in 19,459 tweets, which resulted in 51,793,473 impressions and involved tweets from 2,165 individual Twitter accounts. There were striking geographic and gender trends relating to the accounts which posted #colorectalsurgery tweets and a small number of individuals had considerable influence of the content of tweets posted on the hashtag. There were considerable differences in the key words content of tweets from differing geographical regions.

**Conclusions/Discussion:** Online global communities using healthcare-related hashtags can result in a positive impact for surgical subspecialists engaged in Twitter. #colorectalsurgery has been used to successfully unify social media posts, scientists, surgeons and authors who have an interest in coloproctology. Furthermore, it connects users from geographically separate locations.

#### TARGETING THE WNT BETA-CATENIN PATHWAY AS A CENTRAL DRUG TARGET IN THE DEVELOPMENT OF TREATMENTS FOR COLORECTAL CARCINOMAS.

P408

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**Purpose/Background:** Dysregulation and constitutive activation of the Wnt/beta-catenin pathway, through the Tcf(LEF)/beta-catenin trans-activating complex, is critical in our understanding of colorectal cancer [1, 2]. Over the past two decades, a number of mutations within this pathway have been discovered, as now catalogued by the COSMIC online server [3]. Furthermore, this biochemical pathway contains a number of checkpoints, where small molecule inhibitors are being considered for the development and treatment of colorectal cancer [4]. Where one decides to interfere with this pathway may be critical with regards to what mutation(s) is/are present in any given carcinoma.

**Methods/Interventions:** A PubMed search was conducted. Both synthetic as well as endogenous inhibitors of the Wnt/beta-catenin pathway were considered.

**Results/Outcome(s):** Within the literature, a number of check point inhibitors have been reported on, including those targeting factors upstream from the Tcf(LEF)/beta-catenin trans-activating complex. For example, tankyrase 1 inhibition appears to upregulate and/or stabilize Axin [5, 6], a protein central to the formation of the beta-catenin destruction complex. While in vivo studies utilizing both SW480 and SW620 colon cancer cell lines lead to decreased levels of total and nuclei located beta-catenin, only when the SW480 cell line was treated with tankyrase 1 inhibitor XAV939 in conjunction with 5-FU and cisplatin was significant apoptosis noted [6]. Another approach has been to look at the

functionality of endogenous inhibitors such as ICAT, known for directly inhibiting Tcf/beta-catenin transactivation, while at least in vivo leaving the E-cadherin/beta-catenin adhesion complex untouched [7, 9]. While transfection of SW48 (beta-catenin mutant), DLD-1 (APC mutant), and SNU423 (Axin mutant) cell lines demonstrate striking apoptosis, it is peculiar that transfection of HTC116 (beta-catenin mutant), SW480 (APC mutant), and SNU475 (Axin mutant) cell lines only demonstrate partial to marginal apoptosis.

**Conclusions/Discussion:** Numerous mutations within APC (the central player of the beta-catenin destruction complex) and beta-catenin itself have been documented, with over 80% of all colorectal adenomas and carcinomas being affected [8]. While it may be that the majority of colorectal carcinomas with de-activating APC mutations may not benefit from mono therapy with inhibitors targeting players involving the beta-catenin destruction complex, such as Axin, concomitant targeting of the Tcf/beta-catenin transactivation complex may be required. Therefore, the Tcf(LEF)/beta-catenin complex remains a potential critical drug design target, for which structural elucidation has provided a road map [9].

#### CLINICAL INVESTIGATION OF ALUMINUM POTASSIUM SULFATE AND TANNIC ACID SCLEROTHERAPY FOR INTERNAL HEMORRHOIDS CARRIED OUT BY A SINGLE OPERATOR.

P409

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*Miyazaki, Japan; Miyakonojo, Japan*

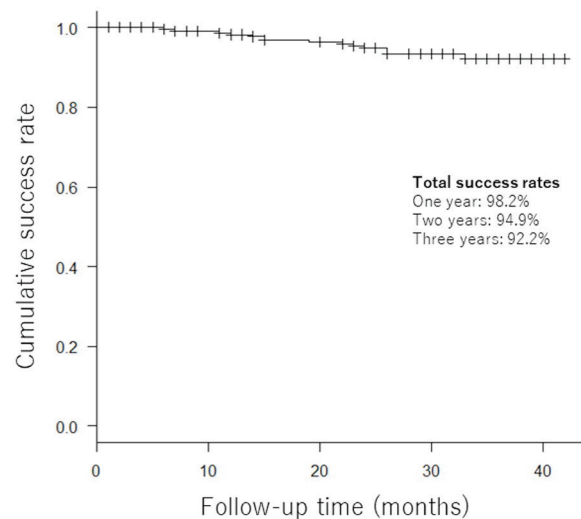
**Purpose/Background:** Hemorrhoids are the most common anorectal disease worldwide. A new and effective sclerotherapy technique, aluminum potassium sulfate and tannic acid (ALTA), has been developed in Japan. ALTA sclerotherapy is frequently performed as a minimally invasive treatment for internal hemorrhoids in Japan and has been reported in more than 480,000 cases to date. We herein present the results of ALTA sclerotherapy carried out by a single operator for grade II and III hemorrhoids during a 3-year follow-up.

**Methods/Interventions:** This investigation was based on the clinical data of 268 patients with hemorrhoids who underwent ALTA sclerotherapy from April 2013 to March 2014. ALTA sclerotherapy was performed on all patients with internal hemorrhoids except patients with associated acute inflammatory internal hemorrhoids and acute irreducible hemorrhoids; patients with serious cardiac, hepatic, renal (including hemodialysis), or hematological diseases; and patients with a history of hypersensitivity to local anesthetics. All procedures were performed with the patient under local anesthesia using a double-slit

proctoscope with a distally opening window that allowed for the application of an injection into the rectal mucosa. The objective of this investigation was to assess the efficacy of this treatment for grade II and III hemorrhoids. Preoperative and postoperative symptoms, complications, and success rates were assessed retrospectively. Follow-up consisted of a simple questionnaire, physical examination, and anoscopic examination. Patients were followed up at 1 day, 2 weeks, 1 month, 3 months, 1 year, 2 years, and 3 years after the ALTA sclerotherapy.

**Results/Outcome(s):** In total, 179 patients were diagnosed with grade II hemorrhoids and 89 were diagnosed with grade III hemorrhoids. Importantly, all patients underwent ALTA sclerotherapy within 10 min (mean  $\pm$  standard deviation,  $4.48 \pm 1.92$  min). The 1-, 2-, and 3-year cumulative success rates of ALTA sclerotherapy for all patients, those with grade II hemorrhoids, and those with grade III hemorrhoids were 98.2%, 98.0%, and 98.6%; 94.9%, 96.7%, and 91.0%; and 92.2%, 95.8%, and 84.1%, respectively. In addition, a low rate of postoperative complications was observed (low-grade fever, 1.1%; decreased blood pressure, 0.4%; and rectal ulceration, 0.4%). No serious or life-threatening complications occurred, and all hemorrhoids improved through conservative treatment.

**Conclusions/Discussion:** ALTA sclerotherapy is an effective treatment for grade II and III internal hemorrhoids, especially grade II hemorrhoids. ALTA sclerotherapy might revolutionize the present state of hemorrhoid treatment and become the ideal method for symptomatic internal hemorrhoids that require surgery. However, additional studies are needed to evaluate the efficacy of ALTA sclerotherapy in the management of hemorrhoidal disease.



## MORTALITY AND MORBIDITY OF THE ALTEMEIER PROCEDURE FOR RECTAL PROLAPSE: A RETROSPECTIVE STUDY.

P410

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*Québec, QC, Canada*

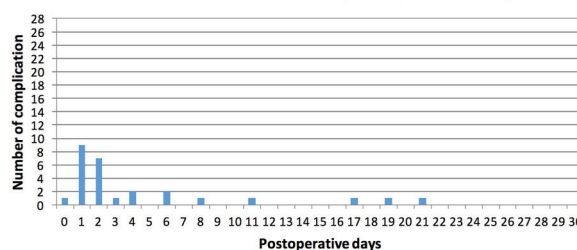
**Purpose/Background:** The Altemeier procedure is frequently performed for the treatment of rectal prolapse especially in patients with significant comorbidities. The purpose of this study was to evaluate short-term mortality and morbidity of the Altemeier procedure in our center.

**Methods/Interventions:** We identified all patients who underwent an Altemeier procedure for the treatment of rectal prolapse between 2004-2014 in our center. Standardized chart review was performed by the main author. The objective was to evaluate the 30-day morbidity / mortality and the timing of complications in relation to the time from surgery. Length of stay and the timing of complications occurring after discharge were also reviewed. The Clavien-Dindo scale was used to grade complications. Univariate analyses were also performed to identify risk for the incidence of complications. The following characteristics were analysed: weight, age, height, BMI, operative time, type of anesthesia, coronary heart disease, high blood pressure, diabetes, dementia, COPD, history of deep vein thrombosis, anticoagulation and atrial fibrillation.

**Results/Outcome(s):** We identified 92 patients having had an Altemeier procedures between 2004 to 2014. The majority of patients were women (93%) with a median age of 82 years old. The overall 30-day complication rate was 22,8% with a 7,6% rate of major complications ( $\geq$  grade 3 on the Clavien-Dindo scale). The 30-day mortality rate was 2,2%. The median length of stay was 3 days. The majority of complications (64,2%) occurred during the first 2 postoperative days. The rate of complication after discharge was 6,5% with a readmission rate of 4,3%. Most readmission occurred after 17 days post-op. Most frequent complications were: myocardial infarction (4,3%), delirium (4,3%), urinary tract infection (3,2%) and anastomotic leak (2,3%). A statistical analysis using logistic regression model showed that advanced age and low weight were both risk factors for complications.

**Conclusions/Discussion:** Despite advanced age and significant comorbidity, the majority of patients in our cohort showed no short-term complications. Major complications rate remains low. The majority of complications occurred during the first 2 days after surgery and the readmission rate is low. Short hospital stay appears to be safe even in this elderly population.

Number of complication per postoperative days



## TREPINE MINIMALLY INVASIVE PROCEDURE FOR PILONIDAL SINUS.

P412

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 M. Gutman, O. Zmora  
*Tel Hashomer, Israel; Tel Aviv, Israel*

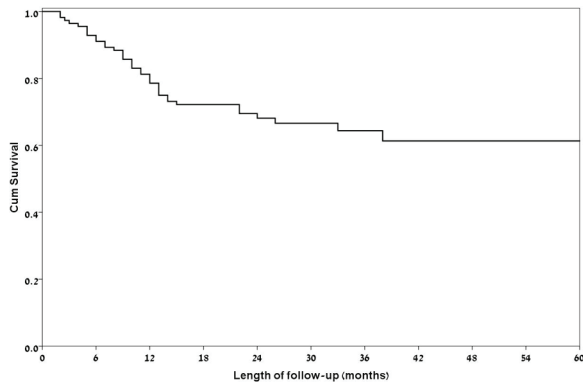
**Purpose/Background:** Controversy exists regarding the preferred surgical management of Pilonidal sinus (PNS). A “minimally invasive” operative approach, using trephines to excise the pilonidal pits and tracts with debridement (but not radical excision) of the underlying cavity has been introduced, but there is paucity of data on the advantages and drawbacks of this procedure. The aim of this study is to assess the short and long term outcomes and success rate of the trephine procedure for the treatment of PNS.

**Methods/Interventions:** A retrospective observational cohort study of all the patients who underwent trephine procedure between 2011 and 2015 with review of a prospectively collected database was performed. Data collection included medical records review and a telephone interview to establish long term follow up.

**Results/Outcome(s):** A total of 169 patients underwent the Trephine technique for the treatment of PNS. 113 patients were available for long term follow up, at a median age of 20 years (IQR 19-25). In the immediate postoperative period, 35.6% of the patients had no pain and 58.6% reported a mild to moderate pain. Postoperative complications included local infection in 7.5% and mild bleeding in 15.1%. None of the complication required surgical intervention or blood transfusions. On early postoperative follow up, 47.1% of the patients reported no impairment to QOL, 25% had mild disturbance (without change in the daily routine), 21.2 % had moderate disturbance and 6.7% had sever disturbance. The median days to return to work or school was 10 (IQR 4-21). At a median follow up was 29 months (IQR 19-40), recurrence rate was 45.1% (51/113) (Figure 1). 38 (33.9%) patients underwent another surgical procedure for the treatment of PNS. Overweight, smoking and family history of PNS were significantly associated with Higher recurrence rate.

**Conclusions/Discussion:** The trephines technique is a minimal surgical intervention with low morbidity, enhanced recovery and minimal to mild postoperative impairment to QOL. Long term recurrence rate is significant (45%), and

should be weighed against the short term advantages. The trephine procedure may be justified as a first treatment of PNS in patients cognizant of the recurrence rate, and may save the prolonged recovery associated with radical excision.



Recurrence Free Survival

#### SUBMUCOSAL APPROACH FLAP WITH EXCISION OF FISTULA TRACT : A NEWLY MODIFIED SPHINCTER-PRESERVING PROCEDURE FOR SUPRASPHINCTERIC FISTULA.

P413

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**Purpose/Background:** Advancement flap repair and LIFT procedure are known to be the major methods in the treatment of complex anal fistula. But, in case of suprasphincteric fistula, these procedures are technically demanding, which are not easy to perform. Submucosal Approach Flap with Excision of fistula tract (SAFE) procedure is a newly modified flap repair through submucosal approach. The purpose of this study is to describe the procedural steps and our experience with SAFE procedure for suprasphincteric fistula.

**Methods/Interventions:** We performed a retrospective review of data that were collected from March 2012 to May 2016. Fifty patients who underwent SAFE procedure were enrolled in this study. All patients had suprasphincteric fistula arising from cryptoglandular infection. Follow-up was scheduled for 2 weeks and 8 weeks after surgery. To evaluate long-term outcome, we interviewed the patients in clinic or by telephone on November 2016. Procedures of SAFE follow as: 1. Identify the internal opening, 2. Incision at intersphincteric groove, 3. Dissection through submucosal plane to find submucosal fistula tract, 4. Core-out of the fistula tract down to the intersphincteric plane and excise the fistula tract, 5. Closure of internal sphincter muscle defect, 6. With the flap pulled down, re-attach the flap to the internal sphincter by sewing in the submucosal

plane, 7. widen the external opening, curette fistula tract, and insert the drain at the external opening side.

**Results/Outcome(s):** The mean age and sex ratio were 45.44 (range, 19-81) years and 47:3 (M/F). Thirteen patients had the recurrent fistulas and previous fistula surgery. Forty-five (90%) fistulas are located at the posterior side. The mean operation time is  $60.70 \pm 18.26$  min. The median hospital stay is  $5.42 \pm 1.13$  day. There were 2 (4%) patients with postoperative bleeding that was managed by hemostasis under anesthesia. Primary healing was observed in 42 (84%) patients on the second follow-up. Persistent fistulas in 8 patients were managed by a second SAFE procedure in four, fistulotomy in three and observation after Incision and drainage in one. Three out of 4 patients who underwent a second SAFE procedure and 3 patients who underwent fistulotomy had complete healing. Long term data were collected in 32 patients among 42 patients with primary healing. Median follow-up period was 24.88 months (range, 8-54). 2 patients developed recurrent fistula. No patients reported any episodes of major incontinence.

**Conclusions/Discussion:** SAFE procedure appears effective and safe for treating suprasphincteric fistula. The potential advantages of the SAFE procedure are better operation field and healthy mucosal flap with minimized damage of blood supply. Further randomized controlled studies are necessary to better evaluate durability and efficacy.

#### A COMPARATIVE STUDY OF THE SHORT-TERM OUTCOMES OF TISSUE-SELECTING TECHNIQUE VERSUS TRADITIONAL STAPLED HAEMORRHOIDOPEXY.

P414

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**Purpose/Background:** Tissue-selecting Technique (TST) is a novel stapled hemorrhoidopexy specifically targeting offending piles, thereby sparing the need for circumferential circular stapling, in order to overcome some of the specific complications of traditional stapled hemorrhoidopexy (SH). The aim of this study was to compare the short term outcomes of SH and TST.

**Methods/Interventions:** Patients aged 18 to 80 presenting with symptomatic second- or third-degree haemorrhoids were recruited. Patients undergone TST or SH were recruited from a prospectively maintained database of minimally invasive procedures done for haemorrhoidal disease. Patient demographics, perioperative data, pre- and post-operative scores for bleeding, prolapse, postoperative pain scores, requirement of additional procedures and patient satisfaction scores were evaluated. Patients with acute thrombosed haemorrhoids, external haemorrhoids only, or other concomitant anal diseases were excluded.

Patients were followed-up in the out-patient clinic at 2<sup>nd</sup> week, 4<sup>th</sup> month and 1 year postoperatively.

**Results/Outcome(s):** From 2008 to 2015, 40 patients have undergone TST and 37 patients have undergone SH. There were no significant differences in the demographic data, preoperative symptom scores, perioperative data like operative time blood loss and length of stay. TST has lower median pain score than SH [3.7 (0.75-9.0) vs 5.0(2.0-9.0) on a scale of 1-10,  $p=0.025$ ]. There was no significant difference between TST and THD in the time until the first postoperative bowel movement (1.55 +/- 1.03 days vs. 2.16 +/- 1.19 days,  $p=0.537$ ). However, TST has shorter time to return to normal daily activities (1.37 +/- 0.68 days vs. 6.78 +/- 5.85 days,  $p,0.005$ ). There were no significant complications in the two groups like bleeding, sepsis, fistula, anal stenosis, fistula. There were no significant difference in the median symptom scores of TST and SH for bleeding (1 vs 1) and prolapse (1 vs 1) in the first four months as well as at 1 year (bleeding: 1 vs 1; prolapse: 1 vs 1). (The scores ranged from 1 – 5, with 1 being asymptomatic and 5 being the worse symptom ever.) The median satisfaction scores after TST and SH at the fourth month were 4 and 2, on a scale of 1-4 (4=excellent satisfaction) ( $p<0.005$ ), respectively. No patients required additional procedures in the early postoperative period

**Conclusions/Discussion:** Both TST and SH are safe and effective, TST has lower median pain score and faster return to normal activities than SH, possibly due to its tissue selecting nature, resulting in higher patient satisfaction.

## RHOMBOID-SHAPED ADVANCEMENT FLAP ANOPLASTY TO TREAT ANAL STENOSIS.

P415

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**Purpose/Background:** Anal stenosis can be caused by any number of insults to the anorectal lining. Common causes include inflammatory bowel disease, trauma, chronic aperient abuse, venereal disease and local radiation therapy. However open surgery of the anorectum (classically Milligan-Morgan haemorrhoidectomy) accounts for approximately 90% of all cases. The consequences are a technical challenge to treat and depending on the aetiology, may require a different approach each time.

**Methods/Interventions:** We present our experience of nine cases treated successfully using a rhomboid-shaped local advancement flap at a tertiary colorectal unit in Sydney, Australia. All nine subjects treated with anoplasty in our unit developed anal stenosis as a complication of open haemorrhoidectomy. They were treated between 2004 and 2016. Three of these were males and six were female. Their ages ranged from 26 to 78 with an average age of 60.1 years. No cases have been excluded.

**Results/Outcome(s):** All nine patients in our series recovered fully and were discharged within 1 day of surgery. No general complications or those specific to the flap sites were recorded during admission. The patients were followed up within 4 weeks of surgery and again at 4 and 12 months. All of our cohort reported significant improvements in their symptoms and were able to pass stools without difficulty. Symptoms that previously affected quality of life such as bleeding and tenesmus were cured by 4 months and this effect had lasted at the yearly review. All were advised to continue measures to soften their stools from discharge. With the exception of the single quadrant stenosis subject, we advised continuing the use of an anal dilator to prevent recurrent stenosis.

**Conclusions/Discussion:** The vast majority of cases of anal stenosis are iatrogenic - the consequence of anorectal surgery. While seemingly obvious, it should be emphasised that meticulous technique should be employed in all cases. Using the obvious example of Milligan-Morgan haemorrhoidectomy, adequate skin bridges need to be left between the excised tissues to prevent any degree of stenosis. Larger or more complex haemorrhoids should be treated in a staged number of sittings to prevent the same complication. As with any wound, excessive suture line tension must be avoided to prevent ischaemia of the flap pedicle and subsequent necrosis. A tension-free wound also highly reduces the risk of keloid or hypertrophic scarring and hence mattress sutures with non absorbable should be considered. It should also be highlighted that it is vital to treat the tissues extremely delicately so as to not induce an inadequate healing response that results in fibrosis and further stenosis.



### ASSESSING SURGEONS' PREFERENCES IN THE MANAGEMENT OF FISTULA- IN- ANO.

P416

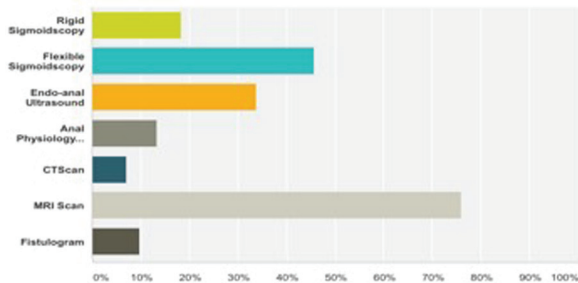
A. Zahid, C. Young  
Sydney, NSW, Australia

**Purpose/Background:** Fistula in ano is a common condition treated by surgeons worldwide. Despite this, there is a paucity of high quality data to aid decision making. Hence, management presents a difficult and frustrating dilemma for the treating surgeon

**Methods/Interventions:** A prospective regional survey was sent to all members of General Surgeons Australia. Questions regarding surgeon demographics, patient evaluation, perianal abscess, simple and complex fistula in ano were presented.

**Results/Outcome(s):** Equipose exists in the management of fistula in ano amongst general surgeons. This was noted in the management of simple and complex fistula in ano.

**Conclusions/Discussion:** Due to the uncertainty in certain clinical scenarios and a paucity of high quality randomised controlled trials on management of fistula in ano, evidence based practice is a challenge to the treating surgeon.



### IMPACT OF SEXUALLY TRANSMITTED DISEASE SCREENING BLOOD TESTS IN COLOPROCTOLOGY HIGH RSK PATIENTS.

P417

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**Purpose/Background:** The increasing practice of anal sex; population of men who have sex with men (MSM); and HIV infection have increased the medical consultation to the colorectal sexually transmitted diseases (STDs) office. In these patients it is recommended to perform the STDs screening blood tests routinely in order to identify both asymptomatic infected population and patients at risk for vaccine preventable STDs. The objective of this study is to assess the impact of the use the STDs screening blood tests routinely at the colorectal STDs office.

**Methods/Interventions:** A retrospective study based on a prospective collected database was performed. Patients with symptomatic anal STDs evaluated between January 2012 and December 2015 were included. STDs screening blood tests [HIV test; serologic test for syphilis (VDRL, FTA ABS); hepatitis B surface antigen (HBsAg); Antibody HBsAg (Anti HBs); Antibody hepatitis C (Anti HCV); Antibody Ig G VHA (Anti VHA)] and the compliance with the recommended vaccination were analyzed.

**Results/Outcome(s):** 215 patients were included. 169 (78 %) were male, 125 (74 %) of which were MSM. The average age was 34 +/- 11 years. 52 (24 %) patients were HIV positive before the consultation. 147 (68 %) had receptive anal sex. 118 (55 %) practiced polygamy in the last year. The main complaint was: anal warts (182); anal syphilis (13); anal warts plus anal syphilis (4); gonorrhoea proctitis (4); chlamydial proctitis (2); herpes perianal (3); HIV ulcerations (7). The STDs screening blood tests findings were: HIV positive in 8 (5%) patients who don't know HIV status previously (150/163) screening; VDRL positive in 25 patients all with positive FTA ABS [17 had compatible anal lesions and 8 (4.5 %) had not suspected syphilis] from 195/215 patients; 5/191 had HBsAg positive, but only one (0.5 %) were unaware of the diagnosis; Antibody hepatitis C did not detect any new case. The assessment of Anti HBs detected 76 (35 %) patients with indication for vaccination of which 56 (73 %) completed the scheme. In MSM group 48 (38%) were detected negative Anti VHA and 32 (66%) completed vaccination.

**Conclusions/Discussion:** The STDs screening blood tests have high patient adhesion and allowed to identify subclinical affections that determine new therapeutic strategies. On the other hand, they allowed the identification of patients at risk for vaccine preventable STDs.

### LONG- TERM RESULTS AFTER STAPLED HEMORRHOIDOPEXY: 11 YEARS OF MEAN FOLLOW-UP.

P418

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**Purpose/Background:** In literature postoperative results after stapled hemorrhoidopexy have only short and medium follow-up and they lack of a long term evaluation. The present study aims to evaluate the long term results after stapled hemorrhoidopexy.

**Methods/Interventions:** All patients undergone stapled hemorrhoidopexy between January 2003 and December 2006 were reviewed. All the procedures were performed using single PPH stapler. Long term follow-up was assessed through specific questionnaires investigating prolapse recurrence rate, functional results, quality of life and the need of further medical or surgical therapy. Statistical

analysis: quantitative data were given as median (range). Comparison between subgroups (i.e. the proportion of patients with prolapse recurrence) was performed using the chi-square test and ANOVA where indicated. The potential risk factors for recurrence were tested using multiple logistic regression analysis: age ( $\leq$ median vs.  $>$  median age), gender (female vs. male), constipation (yes vs. no) and the presence of comorbidity (i.e. diabetes, coagulopathy) (yes vs. no). A p value  $< 0.05$  was considered statistically significant.

**Results/Outcome(s):** Eighty-one patients answered the questionnaires and the mean follow-up was 11 years (range 10-12). A total of 47 patients (58.1%) had not prolapse recurrence with a good reduction of symptoms. The anatomical prolapse recurrence rate was 41.9% but in 79.5% of these cases the severity and frequency of symptoms improved (fig 1 A-B). 8.6 % of the patients needed a further operation and 39.5% sometimes required medical therapy. The impaired continence was distributed as follows: urgency 9.8%, incontinence to flatus 6.1% and liquid stools 2.4%. No cases of incontinence to solid stools were reported. The median satisfaction grade was 4 (range 0-5) and 76.5% of the patients stated that they would undergo this surgery again if necessary (fig 1 C-D). The only risk factor for prolapse recurrence resulting from statistical analysis was female gender (p 0.01).

**Conclusions/Discussion:** Long term results after SH are fairly disappointing in the present study. However, despite the high incidence of anatomical prolapse recurrence, most of the patients referred a good satisfaction rate with symptoms improvement and they would undergo this surgery again because of the good short-term results (less pain, faster recovery and return to work). This condition leads to an open debate about the selection criteria and the use of a tailored approach with new dedicated devices to obtain better long-term results.

Fig 1 A Symptoms distribution recurrence group

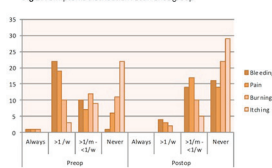


Fig 1 B Symptoms distribution no recurrence group

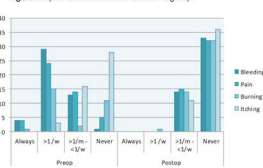


Fig 1 C Satisfaction rate (range 1-5)

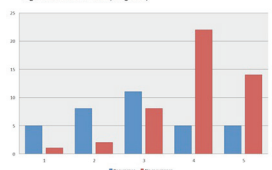
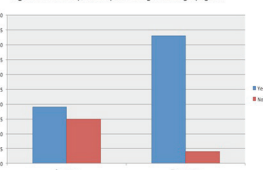


Fig 1 D If necessary, would you undergo this surgery again?



## MAGNETIC SPHINCTER AUGMENTATION IS AN OPTION IN PATIENTS WITH FAILURE OF IMPLANTED ARTIFICIAL BOWEL SPHINCTER.

P419

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**Purpose/Background:** Fecal incontinence (FI) is a distressing condition with major effect on quality of life. Among other operations for FI, we performed 32 implantations of the Artificial Bowel Sphincter between 2005 and 2015. 5 of these ABS had lost function due to technical defects, and FI had set in anew to preoperative extent. Based on our positive experience with Magnetic Sphincter Augmentation (MSA) we suggested explantation of ABS and MSA in one session.

**Methods/Interventions:** We explanted the defect ABS and performed MSA in the same session. The sizer was introduced using the tool provided by the manufacturer. Size of the device was determined as suggested by the manufacturer. The device was implanted into the connective tissue sheath induced by the ABS cuff.

**Results/Outcome(s):** ABS could be removed easily after opening of the surrounding connective tissue sheath that had developed around the cuff. In short term follow up (median 11 months), FI has resolved in all 5 patients. No perioperative complications occurred, and wound healing was undisturbed. All 5 patients are very satisfied with the result of the operation.

**Conclusions/Discussion:** MSA is a valuable option in patients with failed ABS. One could even discuss the option of MSA in selected patients with ABS who are not satisfied with the functional result or who experience difficulty in handling the device.

## MANAGEMENT OF ANASTOMOTIC VAGINAL FISTULAS AFTER COLORECTAL OPERATIONS.

P420

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**Purpose/Background:** Anastomotic-vaginal fistula (AVF) is an uncommon complication following colorectal operations, and management is variable. We aim to present our experience with the surgical management of AVF.

**Methods/Interventions:** A retrospective review of patients evaluated over a 16-year period for fistulae from the colon or rectum to the female genital tract was conducted. We included only patients who underwent a colon or rectal operation with creation of an anastomosis or rectal stump. Fistulas found at the index operation and those secondary to malignancy, radiation, or inflammatory bowel disease (IBD) were excluded. The electronic medical record was reviewed to obtain clinical data

including demographics, clinical presentation, surgical management and outcomes.

**Results/Outcome(s):** Fifty-seven patients with AVF were identified, with a mean age of  $50 \pm 16$ . The index operation preceding development of AVF was rectosigmoid resection with anastomosis in 40 patients, ileal pouch anal anastomosis (IPAA) in 13, sigmoid resection with rectal stump and end colostomy in 3, and total abdominal colectomy with rectal stump in 1 patient. The indication for surgery was colorectal cancer ( $n=27$ ), IBD ( $n=15$ ), diverticular disease ( $n=8$ ), endometriosis ( $n=4$ ), gynecologic malignancy ( $n=2$ ) and pelvic organ prolapse ( $n=1$ ). Thirty-one patients had a history of hysterectomy, and 20 had a history of pelvic irradiation. Median time from index operation to evaluation for AVF was 14 months ( $<1-152$ ). Of 53 patients who underwent operation for AVF, the median number of operations was 2 (1-8). Operative management was performed by multiple disciplines in 30 patients. Operations included segmental resection and anastomotic revision ( $n=12$ ), Hartmann procedure ( $n=1$ ), muscle flap ( $n=6$ ), local flap (Martius flap, mucosal advancement flap) ( $n=4$ ), fibrin glue or fistula plug ( $n=7$ ), fistulectomy via abdominal or perineal approach ( $n=16$ ), draining seton ( $n=7$ ), and intestinal diversion ( $n=14$ ). There is significant overlap between groups, as many patients underwent several different approaches to repair. Abdominoperineal resection with end stoma was ultimately required in 25 patients. Four patients underwent nonoperative management alone. At a median follow up of 10 months, 38 patients had no fistula present, 8 had persistent fistula symptoms, and 9 had no follow up beyond one month.

**Conclusions/Discussion:** AVF following colorectal surgery can present at any time. Management of AVF is challenging, and often requires a multidisciplinary approach and numerous operations to resolve the fistula or reach a solution that is tolerable for the patient. Multiple operative approaches have been successfully used, but there is a high rate of permanent stoma in this patient population.

#### COMPARATIVE STUDY IN THE TREATMENT OF HEMORRHOIDAL DISEASE USING ENDOSCOPIC RUBBER BAND LIGATION.

P421

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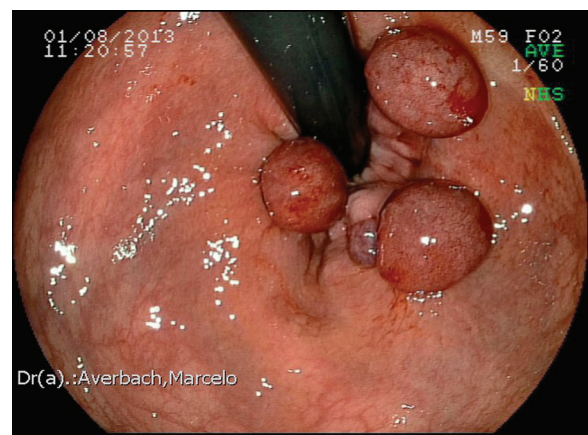
**Purpose/Background:** There are several therapeutic options for symptomatic hemorrhoids, from hygienic and dietary measures to conventional surgery. The best technique adopted for alternative and non-surgical treatment for intermediate grade (II and III) hemorrhoidal disease is rubber band ligation. More recently, the technique has been used with the aid of a gastroscope and a kit of elastic

rubber bands for esophageal varices. This technique was called Endoscopic Rubber Band Ligation of hemorrhoids (ERBL)

**Methods/Interventions:** Analyze the results and the immediate and late complications in patients undergoing ERBL. Compare the incidence of early and late complications and satisfaction with the treatment of patients undergoing one or two rubber band ligatures and patients undergoing three or more rubber band ligatures in the same procedure. A retrospective cohort study, which included patients undergoing endoscopic rubber band ligation from January 2007 to June 2014 at the SBSHSL Endoscopic Unit. Data from medical reports were obtained from hospital and private offices of doctors that performed the procedures, which is then recorded on a standard data collection form. The incidence of early and late complications and the satisfaction with the treatment of patients undergoing until two rubber band ligatures and patients undergoing three or more rubber band ligatures in the same procedure were compared using the chisquare test.

**Results/Outcome(s):** The study included 116 patients, of whom 76 (65.5%) were men. The age of patients ranged from 30 to 88 years (mean age is 53.9 years). The most frequently reported symptom was anal bleeding ( $n=72$ ; 62.1%). The number of rubber band ligatures performed during the ERBL procedure varied from one to six; 84 (72.4%) patients had three or more rubber band ligatures performed during the procedure. No significant associations were observed between the incidence of early or late complications and satisfaction with ERBL among the group subjected until two rubber band ligatures or three or more rubber band ligatures.

**Conclusions/Discussion:** The incidence of early and late complications was low among patients undergoing ERBL, suggesting that the method is as feasible as conventional procedure of rubber band ligation. Performing more than two rubber band ligatures during the same procedure was not significantly associated with increased incidence of complications in short outcomes, which reinforces ERBL as a method of choice for non-surgical treatment of non-complicated hemorrhoidal disease in grades II and III.





## NECROTIZING PERINEAL INFECTIONS (FOURNIER GANGRENE) : OUR EXPERIENCES.

P422

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**Purpose/Background:** Necrotizing perineal infections is invasive infections fascia caused by many types of microorganisms. It is characterized by infectious thrombosis of blood vessels that connect the skin to deep circulation, leading to extensive necrosis of the skin and subcutaneous muscles without involvement. To present results in the treatment of patients because of rare, fatal infections of the skin and subcutaneous tissue of the perineum.

**Methods/Interventions:** From January 2000 to January 2016. on the surgical department of the Public health institution hospital "St. Vrecevi" in Bijeljina were treated with 27 patients with necrotizing fasciitis. All patients were intensively treated. We analyzed the prognostic and predictions factors.

**Results/Outcome(s):** Age of patients was 45.3 +/- 6.7 years. All patients were male. All patients diagnosed on the basis of clinical examination, laboratory and microbiological analyzes. Nine patients had diabetes, 14 were chronic alcoholics. Six patients died in a state of severe septic shock. Have been isolated: 8 in Enterobacteria, Escherichia coli 15, Bacteroides and Streptococcus in 4 patients. In 20 patients the source of infection were perianal abscesses with seven abscess ishiorektalne caves. The average duration of treatment is 23 days.

**Conclusions/Discussion:** The presence of sepsis, the involvement of the perineum, scrotum and pelvis, low hematocrit, high levels of urea and creatine, low albumin were bad prognostic factor. Quick identification, emergency incision, use of antibiotics, intensive care are good prognostic factors.



Local findings in the admission ambulance

## IMPACT OF PROCTOLOGIC SURGERY ON ANAL INTERCOURSE: PRELIMINARY REPORT.

P423

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**Purpose/Background:** The percentage of heterosexual population that experienced and are used to have anal intercourse ranges from 20% to 35% in USA. This practice raises up to 95% in high risk people, including lesbian, gay, bisexual and transgender (LGBT). The percentage of LGBT ranges from 3% to 6.7% of the entire population in different countries reaching around 37% of the whole population which have anal intercourses. Because of the lack of data in literature about the effect of proctologic surgery on anal sex, this study aims to analyse if this type of surgery has an impact on sexual behaviour in both genders.

**Methods/Interventions:** From March 2016 an anonymous questionnaire was submitted to all patients that underwent proctologic surgery in our surgical unit, independently from age and gender. The exclusion criteria were incomplete healing and less than 3 months follow-up. 500 patients are needed to have a sufficiently representative sample.

**Results/Outcome(s):** During the first eight months 261 (138M – 123F) patients answered the questionnaire. The distribution of diseases, surgical treatment, preoperative and postoperative anal intercourse is reported in table 1. Male anal intercourse was 14,5% among men and 7.6% in the whole group. Female anal intercourse was 24,4% among women and 11,5% in the whole group. Preoperative anal intercourse was present in 19.1% and among these 48% abandoned their anal practice after surgery. The

analysis of the data excluding the group of anal warts HPV-related showed a percentage of preoperative anal intercourse of 13.5. After surgery 63.3% of these patients declared that they had abandoned anal intercourses. The causes were 40% fear of pain, 30% experienced pain and 20% not reported. Only 36.7% continued their activity reporting pain, stiffness and partner discomfort.

**Conclusions/Discussion:** Anal sex is a widespread habit between both genders, especially in high risk population. Proctologic procedures may have an impact on this hedonistic practice but there are only few reports with tips and advice about problems after this type of surgery. This is a preliminary report which does not allow to draw any final conclusion because more patients are needed but it shows how most of the patients changed their sexual behaviours after surgery. Hence, nowadays the surgeon has the duty to treat the diseases and even to inform the patient about the possible consequences of proctologic surgery and its influences on anal intercourses.

	N tot	Preoperative AI		Postoperative AI	
		No	Yes	Yes	No
<b>Fistula in ano</b>	<b>51</b>	<b>45 (29M-16F)</b>	<b>6</b>	<b>1 (F)</b>	<b>5 (1M-4F)</b>
Cutting seton	17	15 (9M-6F)	2	0	2 (2 F)
Sphincter saving procedures	34	30 (13M-17F)	4	1 (1 F)	3 (1 M-2F)
<b>Hemorrhoids</b>	<b>128</b>	<b>109 (68M-41F)</b>	<b>19</b>	<b>7 (2M-5F)</b>	<b>12 (4M-8F)</b>
Stapled Hemorrhoidoexy	65	58 (35M-23F)	7	4 (1M-3F)	3 (2M-1F)
Excisional Hemorrhoidectomy	47	39 (26M-13)	8	2 (1M-1F)	6 (2M-4F)
Doppler-guided mucosuspension	16	12 (7M-5F)	4	1(1F)	3 (3F)
<b>Fissure</b>	<b>38</b>	<b>33 (18M-15F)</b>	<b>5</b>	<b>2 (1M-1F)</b>	<b>3 (3F)</b>
Fissurectomy	11	9 (3M-6F)	2	1 (1M)	1 (1F)
Fissurectomy + sphincterotomy	27	24 (15M-9F)	3	1 (1F)	2 (2F)
<b>External Rectal Prolapse</b>	<b>5</b>	<b>5 (5F)</b>	<b>0</b>	<b>0</b>	<b>0</b>
Ventral rectopexy	3	3 (3F)	0	0	0
Altmeier	2	2 (2F)	0	0	0
<b>Obstructed Defecation</b>	<b>17</b>	<b>14 (11M-3F)</b>	<b>3</b>	<b>2 (2F)</b>	<b>1 (1F)</b>
STARR	9	7 (1M-6F)	2	1 (1F)	1 (1F)
Delorme	5	4 (4F)	1	1 (1F)	0
Ventral rectopexy	3	3 (3F)	0	0	0
<b>Other procedures</b>	<b>22</b>	<b>5 (2M-3F)</b>	<b>17</b>	<b>14 (9M-5F)</b>	<b>3 (3M)</b>
Anoplasty	3	3 (3F)	0	0	0
Anal warts HPV-related	17	0	17	14 (9M-5F)	3 (3M)
Removal of rectal scar	2	2 (2M)	0	0	0
<b>TOTAL</b>	<b>261</b>	<b>211</b>	<b>50</b>	<b>26</b>	<b>24</b>

### PRELIMINARY RESULTS OF HIGH INTERSPHINCTERIC DEBRIDEMENT WITH SETON DRAINAGE PRIOR TO THE SPHINCTER-SPARING PROCEDURE FOR THE DEEP POSTERIOR INTERSPHINCTERIC SPACE-INVOLVED HIGH COMPLEX CRYPTOGLANDULAR FISTULAS.

P424

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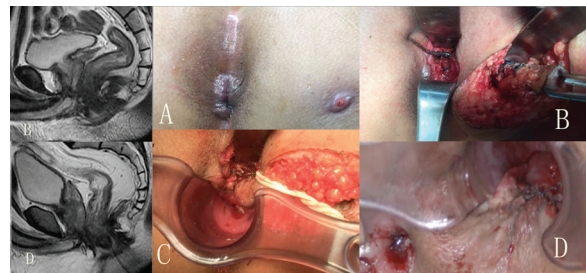
**Purpose/Background:** The deep posterior intersphincteric space (DPIS) has been demonstrated as an important anatomic space in most posterior high complex cryptoglandular fistulas. Omission of the DPIS sepsis may be a primary factor associated with recurrence, especially when performing sphincter-sparing procedure. We conduct the study to evaluate the efficacy of a modified prior procedure combined a high intersphincteric approach to eradicate the DPIS sepsis with the transsphincteric seton drainage before

the definite sphincter-sparing procedure for DPIS-involved high complex fistula.

**Methods/Interventions:** This is a retrospective review of a prospectively collected consecutive series. Included in the study were adult patients who underwent preoperative MRI and had been diagnosed with DPIS-involved high trans- or suprasphincteric cryptoglandular fistulas between January 2015 and July 2016. All patients were treated with a two-staged operation. The initial procedure included a deep intersphincteric approach to debride the DPIS sepsis and a place transsphincteric loose seton for two months. The sphincter-sparing procedure performed two months later included the LIFT, MAF or high internal sphincterectomy. Which type was applied according to the efficacy of the prior therapy. The success rate and postoperative continence were determined.

**Results/Outcome(s):** 22 consecutive patients were treated with the modified staged sphincteric-sparing management. Eleven patients had previous surgeries. None of the 22 patients had complication after the prior surgery. For the 8 patients whom had no sepsis residual in the DPIS after prior procedure, they underwent LIFT procedure ultimately (7 high transsphincteric and 1suprasphincteric fistulas), while 9 patients whom had residual inflammatory granulation tissue in the DPIS, they underwent MAF procedure (4 high transsphincteric and 5 suprasphincteric fistulas). The rest five patients with attenuated residual DPIS sepsis underwent high internal sphincterectomy as the definite surgery. Final success was achieved in 19 (86.4%) of the 22 patients with a median follow-up time of 7 (range, 5–13) months. Success was respectively achieved in 7 (87.5%) of the LIFT group, seven (77.8%) of the MAF group, and 5 (100%) of the internal sphincterectomy group. The three recurrent patients were all healed with a remedial fistulectomy. The preoperative and the postoperative long-term Wexner incontinence scores had no significantly difference in the three groups.

**Conclusions/Discussion:** To perform a high intersphincteric approach to eradicate the DPIS sepsis before the transsphincteric loose seton is safe and may facilitate the following sphincter-sparing procedure. This method should improve the success rate of the sphincter-sparing management when treating DPIS-involved high complex cryptoglandular fistulas.



A DPIS-involved suprasphincteric fistula was treated initially with a deep intersphincteric debridement combined with a suprasphincteric loose seton, following by the mucosal advancement flap two months later.

## PROMPT DIAGNOSIS AND TREATMENT OF PERIANAL ABSCESS DECREASES FISTULA FORMATION: A GUIDE TO THERAPY.

P425

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New York, NY

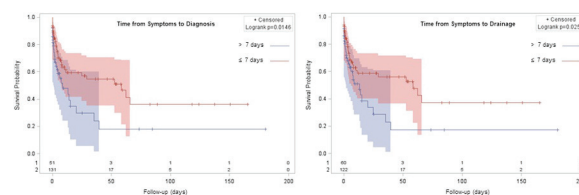
**Purpose/Background:** Perianal abscess is a commonly encountered diagnosis in colorectal surgical practice. The most important intervention is incision and drainage. Despite adequate drainage, half of patients with anal abscesses will develop an anal fistula. There is minimal literature regarding the risk factors for the development of fistulas once an abscess has formed. Specifically, time from beginning of abscess symptoms to drainage has not been studied. Therefore, we aim to identify risk factors for development of anal fistulas after acute anal abscesses and how the role of time of symptoms to diagnosis and treatment impacts rate of fistula formation.

**Methods/Interventions:** A retrospective review of patients with the diagnosis of acute perianal abscesses between 2012 to 2016 was conducted at our tertiary academic medical center. The outcome of interest was fistula formation. Parametric and nonparametric techniques were used where appropriate to identify risk factors for fistula formation. Kaplan-Meier survival plots analyzed by log-rank test were used to compare the risk of fistula formation. Two Cox-Proportional Hazards models censoring for follow-up after intervention were constructed adjusting for multiple clinical factors and either 1) time between symptoms and diagnosis and 2) time between symptoms and intervention. Significance was set at  $p < 0.05$ .

**Results/Outcome(s):** 182 patients met inclusion criteria. The mean age of patients at the time of diagnosis was 41.3 years, and 122 (67%) were male. Sixty-six (36%) developed fistulas in the follow-up period and 116 (64%) did not. Patients who developed a fistula were more likely to have a diagnosis of Crohn's disease (21% vs. 4%,  $p = 0.0003$ ). On univariate analysis, patients were more likely to develop a fistula if they waited over seven days from the time of abscess symptoms to diagnosis ( $p = 0.015$ ) or symptoms to intervention ( $p = 0.026$ ) (Figure 1). On multivariate regression, abscess diagnosis or intervention made over seven days following initial abscess symptoms were significant predictors of fistula formation (HR: 1.9 [1.14-3.08],  $p = 0.014$ ) and (HR: 1.7 [1.02-2.76],  $p = 0.043$ ). No significant differences were noted in age, gender, body mass index, hypertension, past medical history of diabetes or cardiovascular disease, fevers prior to or at time of diagnosis, use of biologic agents, immunosuppression, or anticoagulants, and follow-up time after intervention.

**Conclusions/Discussion:** Development of an anal fistula is common after drainage of a perianal abscess. Diagnosis or drainage of acute anal abscesses over seven

days after initial symptoms were significant predictors of fistula development. The only patient specific factor associated with development of an anal fistula was Crohn's disease. Surgeons and patients should be aware of duration of abscess symptoms, and anal abscesses should be drained in a timely manner to decrease the risk of development of subsequent anal fistulas.



## SYSTEMATIC REVIEW AND NETWORK META-ANALYSIS COMPARING CLINICAL OUTCOMES AND EFFECTIVENESS OF SURGICAL TREATMENTS FOR COMPLEX ANAL FISTULA.

P426

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Chiayi, Taiwan

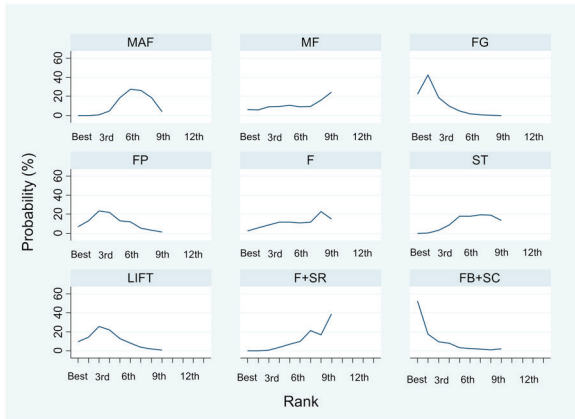
**Purpose/Background:** Complex anal fistula such as trans-sphincteric or extra-sphincteric anal fistula are commonly used for surgical treatment. We conducted a comprehensive systematic reviews and network meta-analysis to compare the clinical effectiveness, recurrent rate, and incontinent rate using different surgical treatments for complex anal fistula.

**Methods/Interventions:** MEDLINE, EMBASE, and the Cochrane Central Register of Controlled Trials (CENTRAL) for relevant randomized controlled trials (RCTs) were searched to identify clinical studies comparing different surgical treatments for complex anal fistula. Two review authors conducted selection of studies, data extraction, and assessment of risk of bias independently. Random-effects models were used to conduct the pairwise meta-analysis and the network meta-analysis.

**Results/Outcome(s):** Overall, 16 studies with 900 patients were included in this study and 13 surgical treatments for complex anal fistula. There was no significantly postoperative recurrent rate between mucosal advancement flap (MAF), marsupialization of fistulotomy (MF), fibrin glue (FG) injection, fistula plug (FP), Fistulectomy (F), steon tube application (ST), ligation of intersphincteric fistula tract (LIFT), autologous stem cell (ASC) injection or another combined surgeries (all  $p$  value  $> 0.05$ ). According to the rankgram to be the best treatment, ASC, ASC+FG, fibrin glue+ surgical closure (FG+SC), fistulectomy, and MF have better postoperative outcomes with lower recurrent rate than other surgical treatments. FG treatment has a significantly lower anal incontinent rate (OR: 0.059, 95% CI: 0.0045-0.7743,  $p = 0.031$ ). FG,

FG+SC, FP, and LIFT have lower incontinent rate than other surgical treatments by the rankgram.

**Conclusions/Discussion:** According to our analyses, the recurrent rate after complex anal fistula surgeries were no significantly difference. The anal incontinent rate was only significantly lower in FG treatment. In conclusion, the surgeons have many surgical strategies to treat complex anal fistula with similar recurrent and incontinent rate.



Ranking of treatment strategies based on probability of their effects on the incontinent rate

**DOES RECTOCELE REPAIR IN COMBINATION WITH OTHER PERINEAL SURGERIES AFFECT OUTCOME COMPARED TO SOLO RECTOCELE REPAIR?**

P427

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**Purpose/Background:** We aim to analyze perioperative morbidity and mortality as well as long term outcome of rectocele repair in combination with other perineal surgeries (RR Combination) and compare this with solo rectocele repair(solo RR).

**Methods/Interventions:** Patients who underwent either solo rectocele repair or rectocele repair in combination with other perineal surgeries between January 2011 and December 2015 were identified from an IRB-approved, prospectively maintained institutional database and reviewed. Demographics, patient characteristics, short and long term complications, morbidity were compared between the two groups. Multivariate logistic or cox regression analysis was conducted for covariate adjustments.

**Results/Outcome(s):** A total of 98 patients were identified with a median age of 57 years. There were 41 (42%) patients in the solo RR group, 57 (58%) in the RR Combination group (Table 1). Fifty patients underwent a transanal repair of which 18 (32%) had combined surgeries (RR). Forty eight patients had a transvaginal repair of which 39(68%) had combined surgeries (RR). Mean follow up was 25(13-42) months. Groups were comparable in

terms of preoperative characteristics and demographics, except operation approach (p<0.01). All of the variables, including estimated blood loss(EBL), length of stay(LOS), self-limiting rectal bleeding, transfusion, urinary retention, rectal stricture, rectal and perineal infection, rectovaginal abscess, reoperation, effective resolution of obstructive defecation symptoms (ODS), residual symptoms and recurrence rates, were comparable between two groups except for operation time(p=0.03). (Table 2)

**Conclusions/Discussion:** Rectocele repair in combination with other perineal surgeries is feasible and outcomes are comparable with solo rectocele repair. Transanal versus transvaginal repairs appear to have no influence on outcomes.

**Table 1** The type of combined surgeries

Combined surgeries	number
Hemorrhoidectomy	17
Iliococcygeus colosuspensions	13
Perineorrhaphy	10
Levator plasty	4
Sling excisions	3
Perineal body repair	3
Partial urethrectomy	1
Enterocele repairs	10

**Table 2** Comparison of peri- and post-operative outcomes between the groups

	Solo RR(n=41)	RR Combination(n=57)	P value
OT(min)	32(21-48)	55(37-78)	<0.001
EBL(ml)	0(0-0)	20(0-50)	<0.001
LOS(days)			0.4
0	39(95%)	53(93%)	
1	0(0%)	2(4%)	
2	2(5%)	1(2%)	
5	0(0%)	1(2%)	
Self-limiting rectal bleeding	8(20%)	2(4%)	0.01
Transfusion	0(0%)	0(0%)	NA
Urinary retention	0(0%)	6(11%)	0.032
Rectal stricture	0(0%)	0(0%)	NA
Rectal and perineal infection	0(0%)	1(2%)	0.39
Rectovaginal abscess	0(0%)	1(2%)	0.39
Combined above all complication	8(20%)	9(16%)	0.63
Reoperation	2(5%)	1(2%)	0.38
Effective resolution of ODS symptoms	41(100%)	54(95%)	0.14
Residual symptoms	4(10%)	7(12%)	0.7
Recurrence	4(10%)	6(11%)	0.9

\*Data were given as median (25-75% percentile).

Tables: **Table 1** The type of combined surgeries

**Table 2** Comparison of peri- and post-operative outcomes between the groups

**PERINEAL HYDROSTATIC INJURY FROM PERSONAL WATERCRAFT.**

P428

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**Purpose/Background:** Personal watercraft use has increased in recent years, resulting in an increased number of traumatic events. Hydrostatic injury to the perineum represents an injury pattern unique to personal watercraft. This often leads to significant morbidity in a primarily

young population. Currently, there is little information regarding the management of these injuries. As a Level I trauma center near a large volume recreational lake with a significant number of personal watercraft injuries, in this study we sought to gain further insight into the management and eventual outcome in this patient group.

**Methods/Interventions:** This is an IRB approved retrospective review of prospectively collected data from the University of Missouri trauma registry. Demographic data, injury patterns, treatments and hospital data were analyzed. Data analysis was performed using standard methods.

**Results/Outcome(s):** Review of our institutional trauma registry of 6244 patients collected from 2010 to 2016, revealed nine patients with perineal injury due to personal watercraft. Patients were primarily female (8, 88.9%) with a median age of 21. The median injury severity score was 10 with a median length of stay of 8 days requiring a median of 2 procedures. Among these nine patients there was significant variability in the scope of injury as well as

management. Three of the nine patients sustained injuries not involving the rectum, including pelvic fracture with pubic diastasis, perineal and labial lacerations, and isolated bladder rupture. Six patients in this group sustained rectal injury. Of these 6 patients, 2 sustained both anal sphincter and rectal injuries and 1 patient required both fecal and urinary diversion due to bladder injury. Five of six patients (83.3%) underwent primary repair of rectal injury with diversion at initial presentation and 1 patient with extra-peritoneal rectal injury underwent transanal primary repair without diversion (16.7%). This patient re-presented with a pelvic abscess 30 days post-injury and underwent diversion at that time. Among the 6 patients with fecal diversion, 4 (66.7%) had restoration of intestinal continuity. One patient was lost to follow up and one is currently undergoing workup for planned restoration of intestinal continuity. Restoration of continuity occurred at a median of 20.5 weeks after ostomy creation.

**P428 Personal Watercraft Injury Patterns and Management**

Age / Gender	MOI	ISS	Injuries	Fecal Diversion	Urinary Diversion	Continuity Reestablished	LOS (Days)	# Procedures
20F	PWC	10	Rectovaginal fistula, cystourethral injury	Yes	Yes	Yes	12	4
15F	PWC	9	Extraperitoneal rectal laceration	Yes	No	Yes	6	2
18F	PWC	16	Intraperitoneal rectal laceration, anal sphincter injury, perineal laceration	Yes	No	Yes	12	5
21F	PWC	9	Extraperitoneal rectal laceration, vaginal and trunk lacerations	yes	No	Unk	8	1
24F	PWC	9	Intraperitoneal rectal laceration	Yes	No	Yes	15	7
29F	PWC	18	Intraperitoneal rectal laceration, uterine artery laceration, transverse colon injury	Yes	No	Planned	20	3
7F	PWC	4	Vaginal laceration	No	No	NA	1	1
44F	BOAT	22	Intraperitoneal bladder rupture, blunt thoracic injury, nasal fracture	No	No	NA	5	1
46M	PWC	14	Perineal contusion, pelvic fractures, lumbar spine fractures	No	No	NA	8	2

MOI: Mechanism of Injury, PWC: Personal Watercraft, ISS: Injury Severity Score, LOS: Length of Stay

**Conclusions/Discussion:** This is the largest series of perineal hydrostatic injuries from personal watercraft reported to date. Complicated perineal injuries related to personal watercraft occurs in a predominantly young female population which can lead to significant long-term morbidity. In this series, we demonstrate that fecal diversion plays an important role in management and the majority of patients undergo restoration of intestinal continuity. Management of these patients requires a thoughtful approach from a multi-disciplinary team to provide appropriate care.

### EFFECTIVENESS OF BOTULINUM TOXIN A INJECTIONS FOR TREATMENT OF ANISMUS AND PROCTALGIA.

P429

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**Purpose/Background:** Botulinum toxin A (Botox) is a commercially marketed injectable medication derived from *Clostridium botulinum* which functions by inhibiting acetylcholine release. While its use for anal fissure is well established, its role in the treatment of anismus and proctalgia remains unclear. Therefore, the goals of this study were to determine the success rate of Botox after initial injection and the dosage required to improve patient symptoms.

**Methods/Interventions:** After IRB approval, patients who received Botox within the Cleveland Clinic system for anismus or proctalgia between 2007 and 2016 were identified from an electronic database. A chart review was performed to extrapolate all data. Anismus was diagnosed by a history and manometric and/or defecographic evidence of paradoxical contraction of the puborectalis muscle. Patients with anorectal pathology such as fissure, Crohn's disease, history of radiation or lost to follow up were excluded from the study. Botox injection was performed either in the operating room under anesthesia or in the office with EMG guidance.

**Results/Outcome(s):** Seventeen patients (53% females) with anismus of a mean age of 51 (range 23 to 81) years were available for follow up at a mean of 12 (range 1 to 59) months. After initial injection of Botox, 9/17 (53%) noted some improvement. Six patients (35%) underwent repeat Botox 3-6 months after the initial injection, 5 of whom (83%) felt improvement with the second dose. The median Botox dose was 100 (range 40-200) units, with 7 patients receiving <100U and 10 patients receiving >100 units. There was no difference in effectiveness between patients receiving < 100 units or greater than 100 units (p=0.58). Seventeen patients (63%) female with proctalgia of a mean age of 62 (range 32 to 84) years were available for follow-up at a mean of 14 (range 1 to 47) months. 8 patients (47%)

noted improvement after one dose of Botox. The median dose was 100 (range 50-200 units) with no difference in effectiveness between > 100 vs < 100 units. 6 patients (35%) received a second dose, 3 of whom (50%) reported improvement with the subsequent injection. A majority of patients with anismus (76%) tried biofeedback therapy before injections compared to 23% of proctalgia patients. There was no difference in Botox effectiveness between patients who did or did not undergo biofeedback either for anismus or for proctalgia=0.89).

**Conclusions/Discussion:** Botox is a nondose related option for patients suffering from anismus or proctalgia, with effective rates in this series being 53% and 43%, respectively. Additional doses help improve success rates in patients that initially responded. Biofeedback before Botox dosing does not improve success.

### DECREASED RECURRENCE RATE WITH PROCEDURE FOR PROLAPSED HEMORRHOIDS COUPLED WITH EXCISIONAL HEMORRHOIDECTOMY.

P430

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**Purpose/Background:** Hemorrhoids are a very common clinical problem facing colon and rectal surgeons. More than 10 million people have hemorrhoid related symptoms each year. Estimates that over 50% of the population over the age of 50 has suffered from hemorrhoids at some point in their lifetime. Our investigative study aims to take a retrospective review of our clinical experience with performing the stapled procedure for prolapsed hemorrhoids (PPH), specifically identify those patients who underwent concomitant excision of external hemorrhoids/skin tags to identify if there exists a lower incidence of disease recurrence when compared to our own as well as historical data for those undergoing PPH alone.

**Methods/Interventions:** We reviewed our data from 2012 to 2015. This was a retrospective chart review. Any patient who underwent PPH during this time period was considered a candidate for inclusion in the study. We separated in our analysis patients who underwent PPH alone compared to those who underwent PPH concomitantly with external hemorrhoidectomy. The data points we reviewed were total time of follow up, time to disease recurrence and/or operative failure, and complications. Recurrence was identified by any patient who underwent additional surgical procedures for hemorrhoid treatment specifically. Patients having additional surgical procedures for outside of recurrence were considered to have had complications to PPH.

**Results/Outcome(s):** We identified 142 total patients meeting our inclusion criteria. Of these, 70 underwent PPH alone and 72 underwent concomitant excision of an external component. Average follow up was 209 days. Demographics in each group were roughly equivalent regarding average age, comorbidities and BMI. The most commonly treated grade of hemorrhoid was grade II at 89 (63%) followed by grade III at 43 (30%). Overall 10 (7%) of patients required additional treatment for residual or recurrent disease with only 2 (3%) of those patients falling under the category of being treated with both PPH and external hemorrhoidectomy. Our overall complication rate was 36% roughly in line with historical data regarding overall complication rates. Complications included patients with incontinence, bleeding, urinary retention, constipation, and neuropathy

**Conclusions/Discussion:** Most of the literature to date shows that PPH does indeed have better postoperative pain control with roughly equivalent complication rates, but with higher recurrence rates when compared to traditional hemorrhoidectomy. Our data suggests that performing excision of any external components in conjunction with PPH leads to no significant change in postoperative pain or complications and yields slightly lower recurrence rate when compared to historical data as well as our own personal experience. As a result we would advocate that PPH can be performed in conjunction with external hemorrhoidectomy in patients with mixed disease with acceptable results.

#### SHOULD I CONSIDER CLEFT LIFT FOR PILONIDAL DISEASE - WILL I STILL BE SATISFIED IN 5 YEARS?

P431

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**Purpose/Background:** Pilonidal disease is a common condition which affects primarily young patients. Many treatment options are utilized, and recurrences rates are significant. Previous studies have shown the effectiveness of the cleft lift procedure over traditional incision and drainage or surgical excision for definitive correction of pilonidal cyst. However, there is limited data on long-term results, patient satisfaction or factors affecting satisfaction. We hypothesize that female patients or those undergoing cleft lift as the primary surgery will have lower satisfaction scores.

**Methods/Interventions:** 167 patients with pilonidal disease who were previously treated by cleft lift procedure from August 2005 to May 2013 were contacted and asked to participate in an outcomes and satisfaction survey. 100 patients (60%) participated. We present findings from

both primary and salvage surgeries on patient satisfaction, the most common complaints expressed, and percentage who retrospectively recommend the procedure.

**Results/Outcome(s):** 87 males and 13 females with an average age of 27 years (range 15-58) at the time of surgery participated in the survey. 33 patients had recurrent pilonidal disease after a previously failed definitive surgery. Median follow-up was 5.8 years (SD = 2.2). Postoperative complications occurred in 33% of patients, most commonly minor areas of skin loss or a seroma. Satisfaction scores (0-10 scale) for the entire group averaged 9.3; 94% had a score of 8 or higher. All patients with satisfaction scores less than 8 were male (n=6). 95% of respondents would recommend the cleft lift procedure to another person. Patients with postoperative complications and those bothered by the appearance of the scar were more likely to report lower satisfaction (p=0.002 and p<0.0001, respectively). Satisfaction levels were not statistically different between males and females, or primary and salvage surgery. Distance of the pilonidal disease from the anal verge was not significantly associated with satisfaction.

**Conclusions/Discussion:** Prior studies have shown that the cleft lift procedure is a highly successful procedure with long-term durability for the management of pilonidal disease. This study shows that patient satisfaction is very high whether done as a primary or salvage procedure, and regardless of gender. Occurrence of postoperative complications and negative reaction to scar appearance were related to a lower long-term satisfaction.

#### APOLLO-2: A RANDOMIZED, DOUBLE-BLIND, PLACEBO- AND ACTIVE-CONTROLLED PHASE 3 STUDY INVESTIGATING OLICERIDINE (TRV130) FOR THE MANAGEMENT OF MODERATE TO SEVERE ACUTE PAIN FOLLOWING ABDOMINOPLASTY.

P432

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**Purpose/Background:** Opioids are widely employed for the management of moderate to severe acute pain; however, opioid-related adverse events (ORAEs), including gastrointestinal (GI) dysfunction and respiratory depression, may limit dosing required for analgesic efficacy. GI effects such as nausea, vomiting, constipation, and ileus, are a major cause of patient-related distress. Conventional opioids bind to  $\mu$  receptors and non-selectively activate two intracellular signaling pathways: the G protein pathway, associated with analgesia; and the  $\beta$ -arrestin pathway, associated with ORAEs and inhibition of G protein-mediated analgesia. Oliceridine (TRV130) is a novel  $\mu$  receptor G protein Pathway Selective ( $\mu$ -GPS) modulator that activates G protein while causing low  $\beta$ -arrestin recruitment to the  $\mu$  receptor. In phase 2, oliceridine

demonstrated the potential to produce rapid analgesia, with a differentiated safety/tolerability profile vs morphine, including improved GI tolerability. Here we evaluated the efficacy and safety of oliceridine and morphine from the randomized, Phase 3 APOLLO-2 study.

**Methods/Interventions:** **Methods/Interventions:** APOLLO-2 is a Phase 3, multicenter, randomized, double-blind, placebo- and active-controlled study. Patients (N=375) experiencing moderate to severe pain following abdominoplasty were randomly assigned into one of 5 treatment groups: IV oliceridine (1.5mg loading dose; 0.1mg, 0.35mg or 0.5mg demand doses), volume-matched placebo, or morphine (4mg loading dose; 1mg demand doses) administered as needed by patient controlled analgesia (PCA) device with a 6 minute lockout for 24h. Etodolac was available as necessary for rescue analgesia. The primary objective of APOLLO-2 was to evaluate the analgesic efficacy of oliceridine compared to placebo. Secondary objectives included comparisons of oliceridine efficacy, safety, and tolerability to morphine.

**Results/Outcome(s): Results/Outcomes:** Results will be presented at the meeting (study ongoing).

**Conclusions/Discussion: Conclusion/Discussion:** APOLLO-2 is the first Phase 3 trial examining the efficacy and safety of oliceridine in patients following soft tissue surgery. Oliceridine is an investigational agent not approved by the FDA.

### LAPAROSCOPIC PERITONEAL LAVAGE OR SURGICAL RESECTION FOR ACUTE PERFORATED SIGMOID DIVERTICULITIS: A SYSTEMATIC REVIEW AND META-ANALYSIS.

P434

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**Purpose/Background:** Laparoscopic peritoneal lavage (LPL) has been proposed as an alternative, less invasive technique in the treatment of acute perforated sigmoid diverticulitis (APSD). The aim of this meta-analysis is to compare the effectiveness of LPL versus surgical resection (SR) in terms of morbidity and mortality in the management of APSD.

**Methods/Interventions:** A comprehensive search was conducted for randomised controlled trials (RCTs) comparing LPL versus SR in the treatment of APSD. The end points included peri-operative mortality, severe adverse events, overall mortality, post-operative abscess, percutaneous reinterventions, reoperation, operative time, postoperative stay, and readmissions.

**Results/Outcome(s):** Three RCTs with a total of 372 patients, randomised to either LPL or SR were included. There was no significant difference in peri-operative mortality between LPL and SR (OR 1.356, 95% CI 0.365 to

5.032,  $p = 0.649$ ), or serious adverse events (OR= 1.866, 95% CI = 0.680 to 5.120,  $p = 0.226$ ). The LPL group was associated with a significantly higher rate of postoperative abscess formation (OR = 4.121, 95% CI = 1.890 to 8.986,  $p = 0.0004$ ) and subsequent percutaneous interventions (OR= 5.414, 95% CI 1.618 to 18.118,  $p = 0.006$ ). Operative time was reduced in the LPL group (WMD = -72.105, 95% CI = -88.335 to -55.876,  $p < 0.0001$ ).

**Conclusions/Discussion:** Laparoscopic peritoneal lavage results in higher rates of postoperative abscess formation requiring more percutaneous drainage interventions for APSD, although no difference in perioperative mortality and serious morbidity was identified. The addition of further randomised trials will improve the certainty of our results.

### OUTPATIENT ADMINISTRATION OF INTRAVENOUS FLUID DOES NOT REDUCE READMISSION RATES FOR PATIENTS WITH NEW ILEOSTOMIES.

P435

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**Purpose/Background:** Patients who require the formation of an ileostomy are at increased risk for ileostomy dysfunction, characterized by transiently elevated stoma output volumes which may lead to dehydration and the need for readmission. The aim of this study was to compare the effect of outpatient crystalloid fluid therapy on 30-day readmission rates and other post-operative outcomes among colorectal patients with new ileostomies.

**Methods/Interventions:** This was a single center, retrospective study (January 2008-October 2015) of consecutive patients who underwent elective and emergent colorectal surgeries that involved the construction of a new ileostomy. ICD-9 codes and CPT codes were used to identify those patients who underwent the insertion of a PICC line or a midline catheter for the administration of one to two liters of outpatient fluid per 24 hour period. These patients were compared to those discharged without intravenous fluids. The primary study outcome was 30 day readmission rate; secondary outcomes included mean length of stay, upper extremity deep venous thrombosis (DVT) and total cost defined as the amount paid by the insurance company or patient, including cost of catheter placement and readmission, as appropriate.

**Results/Outcome(s):** A total of 564 ileostomy patients were identified, of whom 37(6.6%) received outpatient fluid therapy. Severity of illness was similar between the two patient groups, with patients in both cohorts having an average of 1-2 comorbid conditions ( $p=0.62$ ). There were no significant differences in any post-operative outcomes between the two groups ( $p>0.05$ ). The 30-day readmission rate was 16% among those who received outpatient fluids



and 16% among those who did not. There were no readmissions for central line associated blood stream infections among the patients discharged with outpatient fluids. The most common cause of readmission was dehydration and included 3 (8.1%) patients who received outpatient fluids and 26 (5.0%) patients who did not. Post-operative wound infection and intestinal obstruction were the next most common causes of readmission for patients without fluid therapy, occurring in 7 (1.3%) and 9 (1.7%) patients, respectively. No patients who received outpatient fluids were readmitted with either post-operative wound infection or intestinal obstruction. Mean length of stay was similar between those receiving fluids (10 days) and those who did not (9 days;  $p > 0.05$ ), with similar hospital costs (\$24,475 vs. \$23,629;  $p = 0.86$ ). The incidence of DVT was similarly low between the outpatient fluid group (0%) and those receiving no fluids (3%).

**Conclusions/Discussion:** For patients undergoing construction of a new ileostomy, outpatient fluid therapy is not associated with reduced readmission rates or increased complication rates. Attempting to prevent dehydration with outpatient fluids may not be an effective intervention in reducing readmission in this high-risk group.

#### TACKLING DEEP INVASIVE ENDOMETRIOSIS (DIE) WITH ROBOTIC TECHNOLOGY AND A MULTI-DISCIPLINARY TEAM.

P437

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**Purpose/Background:** Endometriosis is a common benign gynecologic condition affecting 10% of women worldwide and because of its tenacious inflammatory nature can lead to chronic pelvic pain, dysmenorrhea and infertility. Clinically DIE is the most advanced evolution of endometriosis and most likely to cause an intense inflammatory reaction involving pelvic structures, primarily the sigmoid colon and rectum. Management revolves around extirpation of endometrial disease and usually requires a multi-disciplinary approach between colorectal and gynecologic surgeons. There are few studies that discuss the outcomes of joint DIE management and even fewer concerning the use of robotics. Our study reports a series of cases of DIE managed robotically at a single institution.

**Methods/Interventions:** We retrospectively reviewed 57 robotic cases performed by gynecologic surgeons at a single institution for endometriosis between 2013 and Q3 2016. A multi-disciplinary approach involving colorectal surgery was employed in 15 of the 57 cases for DIE.

**Results/Outcome(s):** Of the 15 patients who underwent multi-disciplinary care, six (40%) were nulligravid and four (27%) had no history of prior abdominal surgery. The mean age at surgery was 38 years (range 23-46), and the mean BMI was 29 kg/m<sup>2</sup> (range 19-45 kg/m<sup>2</sup>).

Intraoperatively, four (27%) cases required rectal resection, eight (53%) cases required rectal repair and one case required both rectal resection and repair. The average colorectal surgical operative time was 185 minutes (range 75-321 minutes) and the total average operative time was 309 minutes (range 163-535 minutes). The average reported blood loss was 212cc. There were no reported intraoperative conversions. The average post-operative length of stay was 2 days but 5 patients (33%) required re-admission for wound infection (one superficial, four deep). Of those re-admitted, two required percutaneous drainage and one required a diverting ileostomy.

**Conclusions/Discussion:** Deep invasive endometriosis is a tenacious disease process associated with significant pelvic adhesive pathology and is best handled with a multi-disciplinary team of gynecologic and colorectal surgeons. The benefits of improved visualization and enhanced dexterity provided by the robotic platform can aid during these laborious dissections and simplify intracorporeal hollow viscus repair and bowel resection.

#### RISK FACTORS FOR COLONIC DIVERTICULAR BLEEDING RECURRENCE AND EMERGENCY SURGERY.

P438

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**Purpose/Background:** To identify risk factors associated with diverticular rebleeding and emergency surgery.

**Methods/Interventions:** In a nested case-control approach, we analyzed all patients with colonic diverticular bleeding from 2006 to 2016 in a referral center in Mexico City. Diagnosis was performed with colonoscopy. Demographic, comorbidities and treatments were collected and analyzed. Recurrence and emergency surgery were the main outcomes. Uni-, bivariate and multivariate logistic regression model were performed for all variables. Odds ratio (OR) with 95% confidence interval were estimated for each variable. Any  $p$  value  $\leq 0.05$  or 5% (type I error) was considered as statistically significant for a two-tailed hypothesis.

**Results/Outcome(s):** A total of 52 patients met the inclusion criteria. Of those, 32 developed recurrent hemorrhage (the study group), and 20 did not (the control group). The diagnosis of diverticular bleeding was performed by colonoscopy. Subjects were followed up for a median of 4.6 years. Nineteen patients (36.5%) required emergency surgery. In multivariable analysis, patients with NSAID use (OR = 5.84; 95% CI: 1.58-21.51;  $P = 0.005$ ), hyperlipidemia (OR = 5.72; 95% CI: 1.64-19.94;  $P = 0.001$ ) and overweight (OR = 3.85; 95% CI: 1.12-13.19;  $P = 0.019$ ) were found to be independent risk factors for rebleeding.

In addition, patients with 3 or more episodes of bleeding had an increased risk for emergent surgical management (OR= 7.22; 95% CI: 1.44-36.22; P = 0.012).

**Conclusions/Discussion:** Overweight, hyperlipidemia and NSAID use are associated with an increased risk for colonic diverticular rebleeding. Patients with three or more bleeding episodes, that are overweight, have hyperlipidemia, and are taking NSAIDs, may benefit from an elective surgery.

### SURGICAL MANAGEMENT OF ACUTE DIVERTICULITIS: RESECTION WITH END STOMA STILL REIGNS SUPREME.

P439

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**Purpose/Background:** Multiple recent studies have suggested that primary anastomosis with or without proximal diversion is safe and should be the procedure of choice for most patients with acute diverticulitis requiring an emergency operation. This study evaluates whether this surgical approach has been adopted in the U.S.

**Methods/Interventions:** The National Surgical Quality Improvement Program(NSQIP) from the American College of Surgeons for the years 2013 and 2014 was queried. Patients undergoing either an emergency or elective surgical procedure for diverticulitis were selected for analysis. Demographics, surgical procedure, length of hospital stay, morbidity and mortality were analyzed. These parameters for emergency procedures were compared to those for elective operations and analyzed with Chi-Square for categorical variables and T-Test for continuous variables. A logistic regression model was then created to assess the influence of independent variables in the

creation of an end stoma (Table 1). Significance was determined by a P < .05.

**Results/Outcome(s):** During a two-year period, 12,898 patients underwent surgical treatment for diverticulitis at NSQIP participating institutions. 3,056 (23.6%) patients underwent emergency surgery. Compared to an elective procedure, patients undergoing an emergency operation were more likely to have a colon resection without anastomosis (57.8 vs. 5.4%, P<.0001) and performed by the open compared to the laparoscopic technique (85.3 vs. 14.6%, P<.0001). Among emergency cases, factors related to colon resection without anastomosis included: transfer from an outside institution (61.4 vs. 15.3%, P<.0001) and septic shock (75.9 vs. 54.1%, P<.0001). Mortality was higher for patients undergoing an emergency resection without anastomosis compared to those patients who had an anastomosis (3.7 vs. 1.4%, P<.0003). Wound (19.5 vs. 10.7%, P<.0001), pulmonary (12.5 vs. 2.4%, P<.0001) and renal complications (5.1 vs. 2.5%, P<.0001) were higher in patients with resection without anastomosis.

**Conclusions/Discussion:** This study shows that open colon resection without anastomosis continues to be the most employed surgical intervention for the emergency treatment of acute diverticulitis in the U.S. It is associated with a higher complication rate than resection and anastomosis with or without proximal diversion. Delay in treatment for transferred patients may have contributed to the sepsis and intraoperative technical difficulties that led to the high use of resection without anastomosis in these patients. Further reductions in associated morbidity and mortality appear to be dependent upon earlier diagnosis and treatment of patients with acute diverticulitis at their local hospital. Surgeons treating these patients need to more universally adopt the laparoscopic approach and also be willing to embrace primary anastomosis with or without proximal diversion as the procedure of choice when clinically indicated.

#### P439 Multivariable Logistic Regression Analysis of Factors Associated with Creation of End Stoma Among Patients Undergoing Surgery for Acute Diverticulitis

N=12,898	Odds ratio	95% Confidence interval	P value
Emergency intervention	16.7	14.1-19.7	<.0001*
Transfer status	0.6	0.5-0.8	<.0001*
Steroid use	1.7	1.3-2.2	<.0001*
Congestive heart failure	0.7	0.4-1.4	0.4
Acute renal failure	1.0	0.3-2.7	0.9
Dialysis	1.5	0.8-3.0	0.1
Weight loss	0.8	0.5-1.2	0.4
Septic shock	2.9	2.4-3.4	<.0001*
Diabetes	1.1	0.9-1.4	0.1
Dyspnea	0.8	0.5-1.2	0.4
Chronic obstructive pulmonary disease	1.0	0.7-1.3	0.9
Ascites	1.0	0.4-2.3	0.9

\*Statistically significant.

## A NOVEL TECHNIQUE TO REDUCE THE INCIDENCE OF SURGICAL SITE INFECTION IN HIGH-RISK COLORECTAL PATIENTS.

P440

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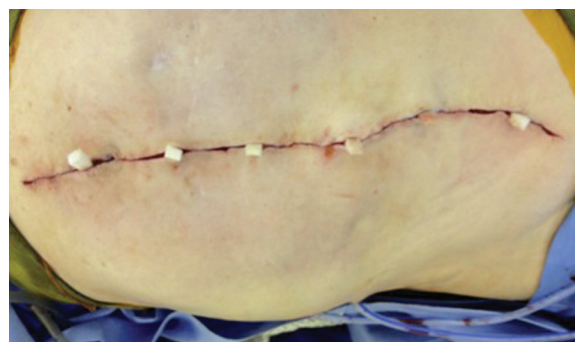
**Purpose/Background:** An innovative negative-pressure wound management system modified from existing vacuum-assisted closure has previously been shown to reduce surgical site occurrences, including seroma formation and surgical site infection (SSI).

**Methods/Interventions:** This is a retrospective study of colorectal patients at high-risk of SSI undergoing laparotomy at a single academic medical center. A modified hybrid vacuum-assisted closure (HVAC) technique was used in 28 patients between September 2015-June 2016 and results compared to all 33 colorectal patients who underwent laparotomy and routine mass closure, identified from our site-specific NSQIP data (2013-2014). The primary outcome was 30-day surgical site occurrences, with secondary outcomes length of stay, wound-related readmissions and reoperation. HVAC includes the closure of fascia and skin, with wicks or rectangular fingers of white VAC sponge inserted through the dermal layer down into the subcutaneous space at intervals of 1 to 2 inches along the entire length of the wound. A total of 3-7 wicks are used. Intervening areas of skin are covered with Vaseline soaked gauze, followed by application of a black VAC sponge that is then covered with contact material and connected via a track pad and suction tubing to a VAC negative-pressure suction pump. HVAC is removed on post-operative day 3-7. Patients were followed-up for 30-days.

**Results/Outcome(s):** In the HVAC cohort, underlying diagnoses included cancer (18), diverticulitis (3) and other (7) including volvulus and ischemic bowel. 10 patients were classified as emergencies and were high-risk regarding age (mean 64 years +/- 11), ASA 3 or 4 (22 patients), wound classification (20 patients class 3 or 4), BMI (mean 28 Kg/m<sup>2</sup>), smoking (16), diabetes (10), and prior operation (10), with a mean operating time of 322 minutes (+/-119). There were no statistically significant differences between the NSQIP and HVAC cohort regarding co-morbidities, but NSQIP patients had a shorter operative time (mean 175 mins +/-88) and lower wound classification (18 patients class 1 or 2). Total surgical site occurrences in the HVAC group included 1 incisional SSI (superficial), 1 seroma, and no hematoma or wound dehiscence. In the NSQIP cohort there were 3 incisional SSIs (2 superficial, 1 deep) and 3 wound dehiscence ( $p>0.05$ ). The average length of stay was 10 days in the HVAC group with 1 non-wound-related readmission and re-operation, vs. 12.7 days and 1 readmission amongst NSQIP patients ( $p>0.05$ ).

**Conclusions/Discussion:** The hybrid vacuum-assisted closure (HVAC) technique is safe and may reduce wound

complications in patients at high risk of developing surgical site infections following complex colorectal procedures.



## CAECAL BASCULE: A CASE SERIES AND LITERATURE REVIEW.

P441

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**Purpose/Background:** Caecal bascule is a rare condition characterized by the inferior pole of the caecum folding on a horizontal axis antero-superiorly towards the ascending colon, potentially causing obstruction. An unusual variant of volvulus, diagnosis is challenging due to its obscurity. We present the experience of an Australian tertiary-referral hospital with the diagnosis/management of caecal bascule, and review cases reported in the literature to raise awareness of this uncommon diagnosis.

**Methods/Interventions:** Medical records of patients diagnosed with caecal bascule in 2001-2016 were reviewed. Data relating to their presentation, investigations, management, and outcomes were obtained. A literature search was conducted through PubMed and Medline databases.

**Results/Outcome(s):** Caecal bascule was diagnosed in four patients (median age 60.5 [range: 48-75] years, two female). Patients presented with abdominal pain (4/4), distension (3/4), vomiting (3/4), and confusion (1/4) over a one to four-day period. Computed tomography identified caecal displacement in three cases, and bascule was diagnosed at laparotomy in all cases. All patients underwent right hemicolectomy, with primary ileo-colic anastomosis in three cases and formation of Abcarian stoma in one. Median length of stay was 15.5 days (range: 10-24), with no mortality. Fifteen cases of caecal bascule have been reported in the literature to date, with authors suggesting resection as definitive treatment.

**Conclusions/Discussion:** Correct diagnosis of caecal bascule requires a high index of suspicion and avoids delay of appropriate management. Recent operation, particularly laparoscopic cholecystectomy, may be contributing factors. Resection is recommended, a sentiment echoed by reported cases in the literature.

### TOWARDS A MORE PERFECT UNION; CORRELATING GUIDELINES & CLINICAL EQUIPOISE IN DIVERTICULITIS MANAGEMENT.

P442

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**Purpose/Background:** To determine current clinical practice within Australia & New Zealand in the management of diverticulitis & assess the correlation with recent internationally recognized guidelines

**Methods/Interventions:** A binational survey was mailed out to members of the Colorectal Surgical Society of Australia & New Zealand to assess correlation with guidelines & clinical equipoise in diverticulitis management using 22 hypothetical clinical scenarios

**Results/Outcome(s):** Of 205 eligible surgeons, 100 (49%) responded, with an average of 14 years surgical practice. Of the 19 guideline based scenarios, only 10 (53%) reached consensus (defined as >70% majority opinion) & correlated with guidelines; while another 3 (16%) reached consensus but did not correlate with guidelines. The remaining 6 (32%) scenarios showed clinical equipoise (defined as less than/equal to 70% majority opinion). These areas included diagnostic imaging where CT scan was contraindicated, management options in failure of conservative therapy for simple & complicated diverticulitis, surgical management of Hinchey grade 3, proximal extent of resection in sigmoid diverticulitis & use of oral, mechanical bowel prep & antibiotics for an elective colectomy. The areas of consensus *not* in accord with guidelines were management of simple diverticulitis, follow up options in a patient with increased risk of recurrent, complicated diverticulitis & follow up after an episode of complicated diverticulitis. A greater proportion of North American sub-specialty trained surgeons would perform a Hartmann's procedure for Hinchey grade 3 (87% vs 51%,  $p=0.011$ ) & also those who have been practicing for greater than 10 years (67% vs 33%,  $p=0.002$ ). A significantly greater number of those practicing in a non-city (tertiary/quaternary) setting (87% vs 55%,  $p=0.005$ ), practicing for more than 10 years (70% vs 48%,  $p=0.04$ ) & European sub-specialty trained (79% vs 56%,  $p=0.039$ ) would proceed to an image guided percutaneous drainage for failed conservative therapy of a small abscess. 50% of rural/regional based surgeons would perform an urgent sigmoid colectomy in failed conservative therapy of diverticulitis compared to only 9% of surgeons based in the city (Fisher's exact 0.017). A greater number of Australian surgeons would perform a Hartmann's operation for Hinchey grade 4 compared to New Zealand based (85% vs 65%,  $p=0.044$ ). In right sided complicated diverticulitis, a much greater number of those in practice for more than 10 years would perform an ileocecal resection and ileocolic anastomosis (78% vs 42%,  $p<0.0001$ ).

**Conclusions/Discussion:** This study highlights that while there are areas of consensus in management of diverticulitis, there is still a need for future research looking at areas of clinical equipoise, potentially in the form of RCTs. It also poses the question of whether location of sub-specialty training & current practice influences our management decisions in diverticulitis.

### ASIAN PATIENTS WITH HINCHEY IA ACUTE DIVERTICULITIS: A CONDITION FOR THE AMBULATORY SETTING?

P443

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**Purpose/Background:** Diverticulitis in Asians is a different disease entity from Western counterparts. Few Asian studies have evaluated the management of acute Hinchey Ia diverticulitis with consideration for outpatient management. The purpose of this study was to evaluate the outcomes of Asian patients with Hinchey Ia acute diverticulitis.

**Methods/Interventions:** A retrospective review of all patients who were treated for Hinchey Ia acute colonic diverticulitis between 2012 and 2014 was performed. All patients were diagnosed on Computed Tomography (CT).

**Results/Outcome(s):** There were 129 patients with Hinchey Ia acute diverticulitis. Fifty-five (42.6%) patients were male, and the median age was 54 years (range, 30 – 86). Eighty-seven (67.4%) patients had right-sided diverticulitis. WBC count and CRP count on presentation were  $12.0 \times 10^9/L$  and 73 mg/L respectively. Most patients were treated empirically with intravenous ceftriaxone and metronidazole (89.1%). They were then discharged with amoxicillin/clavulanic acid (53.2%) or ciprofloxacin and metronidazole (37.1%). Only 6.1% of patients had a positive blood culture. The median length of stay in the hospital was 4 (3 – 4). Only three (2.3%) patients were readmitted for acute diverticulitis within 30-days. They were managed with antibiotics and discharged successfully. The repeated CT scans reconfirmed Hinchey Ia diverticulitis. No patients required emergency surgery, and there were no 30-day mortalities.

**Conclusions/Discussion:** Asian patients with Hinchey Ia diverticulitis recovered well with conservative management and could be amenable to outpatient therapy. Future prospective studies should be performed to in the Asian population to evaluate managing this condition in an ambulatory setting

## DO RESIDENTS PERFORM COLONOSCOPY AS WELL AS CONSULTANTS: AN ANALYSIS OF QUALITY INDICATORS.

P444

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**Purpose/Background:** Endoscopy remains a critical component of General Surgery and Gastroenterology training. Whilst residents need to gain experience, the quality of endoscopy which patients received cannot be compromised. We conducted this study to compare quality indicators between consultants and residents with regards to colonoscopy.

**Methods/Interventions:** A review of colonoscopies from a prospectively collected database was performed from September 2011 to February 2016. Quality indicators such as caecum intubation rate, adenoma detection rate, adherence to a 6-min withdrawal rule, mean number of polyps detected per colonoscope, and complications were collected and compared between the 2 groups.

**Results/Outcome(s):** In total, out of 25,749 colonoscopies that were performed, 14,168 (55.0%) were performed by Consultants. Consultants achieved a better caecum intubation rate compared with residents (96.0% vs 94.9%,  $p < 0.001$ ), and were more compliant to the 6-min withdrawal rule (74.7% vs 68.6%,  $p < 0.001$ ). There were however no statistically significant differences in the adenoma detection rate (33.5% vs 34.5%,  $p = 0.098$ ). Bleeding was a rare complication that was encountered more frequently in colonoscopies performed by consultants than for residents (0.002% vs 0.00008%,  $p < 0.001$ ). There were only three (%) perforations in the entire series, and all were from colonoscopies performed by Consultants.

**Conclusions/Discussion:** Given the proper training, residents are able to perform colonoscopy with the same level of competence as consultants. Whilst colonoscopic related complications are often tied to the difficulty of the procedures, the adherence to the 6-minute withdrawal rule must be reinforced and continually educated to both residents and consultants.

## INFLUENCE OF MRI ON NEGATIVE APPENDECTOMY RATE IN PREGNANCY.

P445

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**Purpose/Background:** Accurate preoperative determination of acute appendicitis in pregnancy is critical when considering potential complication risks. This study aimed to investigate the efficacy of magnetic resonance imaging (MRI) preoperatively done in emergency room (ER) in diagnosing an acute appendicitis for pregnant women.

**Methods/Interventions:** A total of 94 pregnant women with initially diagnosed as an acute appendicitis at Severance Hospital and Gangnam Severance Hospital between September 2006 and May 2016 were retrospectively selected. All patients underwent either or both ultrasonography (US) and MRI preoperatively in ER and underwent emergency laparoscopic or open appendectomy. Among them, 80 patients are finally enrolled after exclusion of 14 patients who had no remained official findings of the US and MRIs.

**Results/Outcome(s):** Negative appendectomy rate was 11.3% (9/80) (2- serosal congestion of mesoappendix, 6 - lymphoid hyperplasia, 1- endometriosis). Fifty-nine patients (73.6%) underwent US, 40 cases (50%) underwent MRI and 19 cases (23.8%) underwent both US and MRI. Sensitivity and specificity of US and MRI were 74.5%, 62.5% and 94.4%, 25% respectively. In a total of 18 cases with undetermined US findings, however, negative appendectomy rate in patients who adding a MRI did not differ in comparison to patients who did not perform a MRI [2/10 (20%) vs. 3/8 (37.5%),  $P = 0.608$ ].

**Conclusions/Discussion:** MRI showed high sensitivity in diagnosing acute appendicitis for pregnant women. However, to refrain from practicing superfluous preoperative imaging tests for preventing negative appendectomy in high risk patients, the impact of adding MRI in case of undetermined US findings need further validation.

## QUANTITATIVE PERFUSION ASSESSMENT IN LEFT-SIDED COLONIC RESECTION - THE ROLE OF PERFUSION IN ANASTOMOTIC LEAKAGE AND FACTORS THAT AFFECT COLONIC PERFUSION.

P446

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**Purpose/Background:** Adequate colonic perfusion is essential for anastomotic healing. Intraoperative quantitative assessment of colonic perfusion allows demonstration of the role of perfusion in anastomotic healing in real clinical setting.

**Methods/Interventions:** Patients who underwent elective left-sided colorectal resection were included. Intraoperative quantitative perfusion assessment was performed with intravenous indocyanine-green injection and fluorescence angiography, using the SPY Elite System (Novadaq, Canada). Perfusion was represented by the 'perfusion value', from 0-255, which reflected the intensity of fluorescence. The flushing time, perfusion value at the maximally perfused part in the exteriorized colon and at the site of transection was recorded. Patients' demographic, intraoperative and postoperative data was prospectively collected.

**Results/Outcome(s):** The study included 73 patients. Three (4.3%) had anastomotic leakage. The maximal perfusion value from the exteriorized colon was significantly lower in the leakage group 130.7±64.3 vs 212.5±52.1, p=0.010. Male gender (p=0.050), rectal lesions (p=0.016), laparoscopic approach (p=0.019), low anterior resections (p=0.018), total mesorectal excisions (p=0.007), left colic artery ligation (p=0.041) and transanal retrieval of specimens (p=0.006) were associated with poorer perfusion of the exteriorized left colon.

**Conclusions/Discussion:** Poor perfusion in the left colon is associated with anastomotic leakage. The colonic perfusion is more challenged in operations involving rectal lesions with low anterior resections and total mesorectal excisions. Retrieval of specimens via small wounds or the transanal route may result in reduced perfusion in the exteriorized part. Low ligation with preservation of the left colic artery improves perfusion of the left colon.

Table 2. The association between various parameters and colonic perfusion.

	No.	%	Maximal perfusion		p	Perfusion at the transection site		p
			Mean	SD		Mean	SD	
Age								
≥75	17	23.3	223.8±	38.3	0.210	186.6±	66.2	0.168
<75	56	76.7	204.7±	58.2		161.4±	65.3	
Gender								
Male	46	63.0	199.6±	56.5	0.050	66.0±	9.7	0.002
Female	27	37.0	225.5±	47.9		54.3±	10.4	
BMI								
≥ 25 kg/m <sup>2</sup>	31	43.7	201.5±	57.4	0.292	162.4±	72.7	0.637
< 25 kg/m <sup>2</sup>	40	56.3	215.4±	52.6		170.0±	60.9	
ASA 3 or above								
Yes	21	28.8	207.3±	52.6	0.853	162.0±	67.3	0.670
No	52	71.2	209.9±	55.9		169.4±	66.0	
History of CVA or IHD								
Yes	10	13.9	220.6±	43.7	0.457	170.5±	49.7	0.820
No	62	86.1	206.6±	56.4		165.4±	68.1	
Smoking history								
Yes	32	44.4	199.6±	57.8	0.215	150.6±	64.6	0.072
No	40	55.6	215.8±	51.8		178.5±	64.5	
Diabetes								
Yes	15	20.8	207.6±	60.3	0.940	169.2±	79.0	0.838
No	57	79.2	208.8±	53.7		165.3±	62.4	
Neoadjuvant CRT								
Yes	24	32.9	201.9±	12.0	0.431	160.9±	63.0	0.568
No	49	67.1	212.7±	52.7		170.4±	67.8	
Location of pathology								
Sigmoid or above	21	28.8	233.1±	28.9	0.016	179.1±	59.1	0.334
Rectum	52	71.2	200.0±	59.6		162.5±	68.5	
Approach								
Laparoscopic	63	86.3	203.3±	56.3	0.019	160.5±	67.6	0.026
Open	10	13.7	246.4±	14.7		210.0±	31.4	
Location of transection								
Sigmoid	50	68.5	211.1±	54.2	0.652	173.9±	69.1	0.211
Descending or above	23	31.5	204.9±	56.3		153.0±	57.3	
Procedure								
LAR	32	43.8	226.1±	39.3	0.018	181.5±	62.1	0.105
LAR	41	56.2	195.9±	61.3		156.2±	67.5	
TME								
Yes	38	52.1	192.9±	59.2	0.007	148.6±	66.0	0.011
No	35	47.9	226.8±	43.3		187.5±	60.5	
Left colic artery preservation								
Yes	18	25.0	232.8±	38.5	0.041	194.9±	50.7	0.050
No	54	75.0	203.3±	55.9		160.5±	66.7	
Transanal retrieval								
Yes	9	12.3	163.4±	69.8	0.006	115.1±	63.9	0.010
No	64	87.7	215.6±	49.5		174.6±	63.3	
Splenic flexure mobilization								
Yes	42	57.5	206.0±	55.3	0.574	166.8±	67.7	0.939
No	31	42.5	213.4±	54.3		168.0±	64.6	
Coloanal anastomosis								
Yes	11	15.1	193.2±	59.5	0.295	152.2±	56.0	0.414
No	62	84.9	212.0±	53.7		170.0±	67.6	
Intraoperative use of vasopressors								
Yes	50	68.5	212.9±	48.2	0.393	166.0±	67.0	0.810
No	23	31.5	201.0±	66.9		170.0±	65.1	
Systolic blood pressure at the time of measurement								
≥100mmHg	47	64.4	215.3±	47.5	0.197	177.9±	58.9	0.064
<100mmHg	26	35.6	198.0±	65.0		148.1±	74.5	
FI02 at the time of measurement								
≥40%	56	76.7	207.6±	58.9	0.661	167.0±	70.2	0.956
<40%	17	23.3	214.3±	38.0		168.1±	51.5	

**SACRAL NERVE STIMULATION FOR CHRONIC CONSTIPATION.**

P447

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**Purpose/Background:** Chronic severe constipation is a common gastrointestinal disorder that can afflict up to 20% of the population. It is more common in the elderly and female patients. This can be caused by slow transit, pelvic floor dysfunction, and idiopathic. Conservative medical treatments as well as biofeedback have limited success for many patients. As a last resort, colectomies as well as stoma is associated with a higher morbidity and possible mortality. SNS (sacral nerve stimulator) have been shown with limited success at other institutions. We evaluated our experience with SNS for patients with chronic constipation.

**Methods/Interventions:** A prospective study of patients who failed conservative management of constipation and or biofeedback but not yet ready for a more invasive surgery underwent the test phase before consideration of a permanent implantation generator (IPG). Patients with greater than fifty percent improvement then underwent stage 2 permanent neurostimulator implantation. Primary end point were increased frequency of bowel movement without laxatives.

**Results/Outcome(s):** Between November 2014- January 2016, 12 patients (female median age 42) underwent the test stimulation of whom 6(50%) noted improvement of their symptoms and went on to permanent lead placement. Of these, 5 of 6 (83%) patients achieved treatment success. After a median 12 (range 4-25) months follow-up, defecation frequency increased from 1.2-4.9. 1 of the 6 patient had improvement in their symptoms of constipation up to 7 months but lost its efficacy after 7 months despite increased stimulation. Cleveland Clinic score (0=severe to 100=no symptoms) increased from 4-68. 1 of the 6 patient had explantation of the device from late failure.

**Conclusions/Discussion:** SNS can be effective for those with intractable constipation that failed conservative medical therapy. It is less invasive than the higher morbidity of abdominal surgical resection but the success rate is only 40% in our small group. Despite the low numbers, it is a minimally invasive way of improve the debilitating condition of chronic constipation.

## POLYGLACTIN MESH INLAY FOR COMBINED GASTROINTESTINAL RECONSTRUCTION AND ABDOMINAL WALL REPAIR (AWR). A SAFE, EFFECTIVE AND INEXPENSIVE ALTERNATIVE TO BIOLOGICS.

P448

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**Purpose/Background:** Takedown of enterocutaneous fistulas in open abdominal wounds presents a significant surgical challenge. The optimum method of reconstruction for large contaminated abdominal wall defects remains unclear. We present the outcome of a series of patients with massive contaminated abdominal wall defects requiring combined gut and abdominal wall reconstruction, in which Polyglactin mesh inlay was used alone or in combination with separation of components.

**Methods/Interventions:** Consecutive patients from 5th May 2006 - 24<sup>th</sup> April 2014 from a single specialist national centre, with intestinal fistulation and/or requirements for re-establishment of intestinal continuity associated with large associated abdominal wall defects, underwent combined gastrointestinal and AWR surgery. Data were collected from a prospectively maintained database, along with electronic patient record and paper notes. Postoperative adverse events were classified using Clavien-Dindo grading and follow up was undertaken for a median (range) follow up of 12 (1-66) months

**Results/Outcome(s):** 75 patients (47 male, mean age: 49.1 years, median ASA 3) underwent elective reconstructive surgery. Patients had undergone a mean (range) of 3.5 (1-10) previous laparotomies. 72 procedures were performed electively. 65 (86%) patients had enteroatmospheric or enterocutaneous fistulae and 10 patients had massive abdominal wall defects with a simultaneous requirement for reestablishment of intestinal continuity. 16 patients were smokers, 4 were diabetic and 12 patients had Crohn's disease. 50 (75%) of patients were dependent on artificial nutrition prior to surgery. 55 (73%) patients had component separation. All patients had polyglactin mesh positioned as; inlay in 31(41.3%), bridge 30 (40%) and inlay+bridge 14 (18.7%). Postoperative 30 day mortality was 0%, and morbidity was 34.1% (Clavien-Dindo 18 grade 1, 6 grade 2, 1 grade 3 and 3 grade 4). 25 (33.3%) patients developed postoperative incisional hernias; Of these, 5 were asymptomatic and only 6 (8%) required subsequent operative repair. 6 (8%) patients developed recurrent fistulas, 1 of which healed within 6 weeks of surgery. There was 1 postoperative death from cardiac failure, 5 months following surgery.

**Conclusions/Discussion:** Polyglactin mesh inlay repair is a simple, inexpensive and safe method for AWR in a contaminated field. This technique has a postoperative complication rate, with low levels of fistulation and

requirements for future incisional hernia repair, which is better than similar series using considerably more expensive biological implants.

## HIGH-RISK PATIENTS WITH HINCHEY III DIVERTICULITIS: IS PRIMARY SIGMOID RESECTION BETTER THAN LAPAROSCOPIC PERITONEAL LAVAGE?

P449

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**Purpose/Background: Background:** Laparoscopic peritoneal lavage (PL) is a more conservative procedure than primary sigmoid resection (SR) in acute diverticulitis complicated with purulent peritonitis (Hinchey III). However, several studies have recently highlighted the high rate of PL failure leading to early reoperation in 10 to 30% of patients. Patients with severe comorbidities or older than 80 years have significantly more risk than others to fail to PL. This subpopulation of Hinchey III diverticulitis patients is also at higher risk for morbidity and mortality after SR. The purpose of the study was to compare postoperative outcomes between PL and primary SR in 'high-risk' Hinchey III diverticulitis patients.

**Methods/Interventions: Methods:** In 3 hospital centers, the clinical data of all patients operated on for Hinchey III diverticulitis between 2006 and 2015 were reviewed. Patients with Hinchey II or IV diverticulitis diagnosed at laparoscopy were excluded. All 'high-risk' patients (age  $\geq$  80 years, ASA  $\geq$  3 or immunosuppression) operated on with PL were age, ASA and immunosuppression-matched to patients operated on with primary SR during the same period. In both "PL" and "SR" groups, preoperative characteristics and severe complication rate (Dindo grade  $\geq$  3b) were retrospectively collected and compared.

**Results/Outcome(s): Results:** Among 162 patients operated on for Hinchey III diverticulitis, 36 'high-risk' patients were included in the study (18 patients in PL group and 18 patients in SR group). Patient characteristics were similar in both groups in terms of age ( $72 \pm 11$  vs  $74 \pm 11$  years), sex (38% female each group), BMI ( $24 \pm 5$  vs  $27 \pm 5$ ), ASA score (61% ASA  $\geq$  3 each group), immunosuppression (38% each group), previous history of diverticulitis (6 vs 16%) or abdominal surgery (33 vs 38%) and hemodynamic instability (0% each group). In SR group, 17 (94%) patients were operated on with a Hartmann procedure and 1(6%) with a sigmoidectomy plus primary anastomosis. Severe complication rate was not significantly different between PL and SR groups (38 vs 22%;  $p=ns$ ). Patients operated on with PL had a non-significant but lower postoperative life-threatening medical complication rate (6 vs 16%;  $p=ns$ ). However, reoperation rate was significantly higher in PL group (27% vs 6%,  $p<0.05$ ). One

patient died from medical complication in the PL group whereas no patient died in the SR group.

**Conclusions/Discussion: Conclusion:** In our study, the morbidity rate was not significantly different between PL and SR in high-risk Hinchey III diverticulitis patients. This observation could be due to the different nature of postoperative complications according to the surgical procedure. The reoperation rate is higher after PL but life-threatening medical complications are more frequent after SR in patients with similar characteristics. Larger studies are required to confirm our results.

#### DOES THE DRAINAGE ROUTE MATTER IN CONSERVATIVE MANAGEMENT OF ANASTOMOTIC LEAKS? A COMPARISON OF TRANSPERITONEAL VERSUS TRANSGLUTEAL DRAINAGE IN POSTOPERATIVE ABSCESSSES AFTER COLORECTAL RESECTION.

P450

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**Purpose/Background:** Intra-abdominal abscess formation is a frequent postoperative complication in both elective and emergent colorectal surgery. Percutaneous drainage is a well-known alternative to immediate surgical management but there is limited literature comparing the different routes of drainage, specifically of transgluteal drainage which has long been avoided by some surgeons due to the theoretical risk of complex fistula formation. We compared the clinical outcomes and characteristics of patients undergoing transperitoneal drainage (TPD) versus transgluteal drainage (TGD) in abscesses arising after colorectal resection.

**Methods/Interventions:** A retrospective review of radiologic procedure notes was performed to identify all patients who underwent percutaneous drainage of an intra-abdominal abscess following colorectal resection between 2011 and 2015 at our institution. Data pertaining to patient characteristics, type of surgery and outcomes following drainage was analyzed to determine success rates, need for subsequent intervention (i.e. repeat percutaneous drainage versus surgical management), fistula formation, and to evaluate for procedure-related complications.

**Results/Outcome(s):** We identified 44 patients including 23 men and 21 women with a mean age of 66 years (range 36-96 years). Twenty-six (59%) patients underwent TPD, while 18 (41%) underwent TGD. Abscess size identified on postoperative imaging ranged from 30 to 230mm (mean = 81.2mm). There were no immediate procedure-related complications. The most common index procedure was anterior resection in 23 (52.3%) patients, followed by right hemicolectomy in 8 (18.2%) patients, total colectomy in 7 (15.9%) patients,

Hartmann reversal in 3 (6.8%) patients, transverse colectomy in 2 (4.5%) patients, and 1 (2.27%) patient with abdominoperineal resection. Median follow-up was 96.4 days with 3 patients lost to follow-up. Complete resolution of abscess was observed in 27/41 (65.9%) patients (15 TPD : 12 TGD) while 10/41 (24.4%) patients required subsequent intervention, of which 5 (3 TPD : 2 TGD) required repeat percutaneous drainage and 5 (4 TPD : 1 TGD) that required surgical management (2 repeat resections, 2 transrectal drainages, 1 loop ileostomy). 4/41 (9.8%) patients (3 TPD : 1 TGD) developed fistulas that resolved with antibiotic therapy.

**Conclusions/Discussion:** The outcomes between transperitoneal and transgluteal drainage of intra-abdominal abscesses following colorectal resection were comparable. A transgluteal route of drainage should therefore not be avoided if technically feasible under appropriate circumstances for conservative management of anastomotic leaks following colorectal resection.

#### A RANDOMISED CONTROLLED STUDY TO EVALUATE WHETHER THE ADMINISTRATION OF IV FLUIDS DURING ROUTINE COLONOSCOPY MAKES A DIFFERENCE TO PATIENT OUTCOMES.

P451

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**Purpose/Background:** This study will establish whether there is a role for IV fluids in improving patient outcomes during routine colonoscopies. In this study two randomized cohorts will be established, those receiving IV fluids during their colonoscopy, and those not receiving any fluids. Patient outcomes will be measured using the primary outcomes of hypotensive episodes and electrolyte changes; and secondary outcomes of patient satisfaction and hydration surveys. Normal saline infusions are given routinely during elective colonoscopy. However, this practice has recently been called into question by studies demonstrating that infused volumes are typically low, and do not relate to those who develop peri-procedure hypotension nor postoperative morbidity. Routine colonoscopies are largely performed on patients who are systemically well, and unless complications are experienced there is limited associated fluid loss. Additionally, unlike surgical procedures, patients can continue to consume clear fluids up until 2 hours before the procedure, and as such their base level hydration should be superior.

**Methods/Interventions:** The trial will be a single blinded randomised controlled trial. Patients will be blinded to which therapy they receive; it will not be possible to blind the surgeons/anaesthetists as to what treatment was given. Two cohorts of 235 patients will be selected



and appropriately randomised to either 1) receive fluids during their procedure, or 2) not to receive fluids. The primary outcomes measured will be hypotensive episodes and derangement in electrolytes. Secondary outcomes will include quality of recovery scores, post-anaesthetic recovery scores, and patient-completed visual analogue scales to assess nausea, headache, dizziness and drowsiness. Based on clinical experience, we would anticipate that 5% of patients would experience a drop of blood pressure greater than 20%. Allowing for a difference of interest of 0.05, we would require a sample of 235 patients per group to assess equivalence at the requisite level of power.

**Results/Outcome(s):** Results regarding the primary and secondary outcomes will be extracted for statistical analysis. The existing body of literature would suggest that providing intravenous fluids during colonoscopy results in no significant difference to patients. It is important to note however that all previous work in this area has been based on retrospective analyses and therefore no control populations were used to compare outcomes.

**Conclusions/Discussion:** If the data collected is able to prove the Null Hypothesis this study will provide level II evidence to support previous studies in their conclusions that there is no significant benefit to administering IV fluids during routine colonoscopies. This will have an impact on current practice and provide potential cost savings for large institutions regularly performing scope procedures.

#### LONG-TERM OUTCOMES IN THE SURGICAL TREATMENT OF COLORECTAL ENDOMETRIOSIS: A TRIUMPH FOR FERTILITY WITH MINIMAL MORBIDITY.

P452

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**Purpose/Background:** Endometriosis, characterized by the presence of endometrial glands and stroma outside the uterine cavity, remains one of the most common conditions requiring surgery for women during their reproductive years. It is commonly associated with disabling pain and infertility. In 1994, our practice published a series of 130 open bowel resections for endometriosis. With no diversions, rectovaginal fistulas, anastomotic leaks or recurrences, our results suggested that aggressive surgery for endometriosis is feasible and safe with a low complication and morbidity rate. More recent studies of laparoscopic resections for endometriosis reported a 12% diversion rate and 8.8% recurrence rate. In this study, we examine our series of open resections for Stage 4 endometriosis from 2011 to 2015 and seek to identify outcomes in relation to type of resection performed.

**Methods/Interventions:** A retrospective chart review was conducted through our clinic's electronic medical

record. We queried our patient database for the ICD 9 and 10 codes for endometriosis and intestinal endometriosis from the years 2011 to 2015. Each chart was meticulously reviewed for patient demographics, type of resection performed, need for diversion, postoperative complications, reoperation, recurrence, length of stay and crude fertility rate. Statistical analysis was performed.

**Results/Outcome(s):** Data collected, up to this point, for 2014 and 2015 were analyzed. The total resections over two years was, (n=138). Resections were categorized as bowel excisions (63), small bowel resections (3), ileocecectomy (6), low anterior resections (53), and low anterior resections with ileocecectomy, double resections (13). Rectovaginal septum involvement was noted in 85 patients (61%). The complication rate associated with low anterior resections was 9%. Our overall complication rate is 7.2% for all procedures. No rectovaginal fistulas and no anastomotic leaks were reported. Only 2 patients necessitated a diverting loop ileostomy (1.4%). No recurrence of endometriosis was noted and the crude fertility rate was >90% with in vitro fertilization. Our average LOS was 4 days.

**Conclusions/Discussion:** Severe deeply infiltrating endometriosis is a debilitating disease that requires precise and meticulous technique. Our data accrued from open resections demonstrates that successful resolution of endometriosis is achieved with a fertility rate of > 90% with in vitro fertilization with minimal hospital length of stay and morbidity.

#### COLONIC INERTIA AND FIBROMYALGIA.

P453

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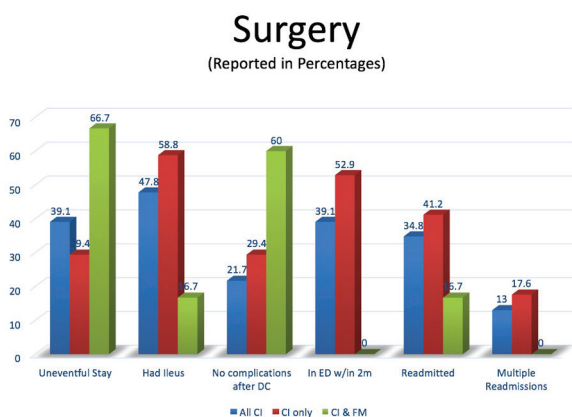
**Purpose/Background:** Fibromyalgia (FM) is characterized by chronic diffuse musculoskeletal pain, fatigue, sleep disturbances, exaggerated tenderness at muscle, tendon insertion sites as well as chronic constipation. Chronic constipation, is present in 32-80% of patients with FM. Patients with chronic constipation are categorized as normal transit or irritable bowel syndrome, pelvic floor dysfunction, and slow transit constipation. Slow transit constipation, colonic inertia (CI), refers to patients who primarily complain of constipation and have delayed colonic transit, but no underlying systemic disorder or pelvic floor dysfunction. This study was conducted to identify correlations between CI and FM.

**Methods/Interventions:** A retrospective chart review was conducted of patients diagnosed with slow transit constipation between January 2004 and March 2015. Records identified 860 patients with slow transit constipation between the ages of 17 and 75 with an abnormal sitz marker test. Exclusion criteria included constipation related to medication usage, neural or muscular disorder, congenital abnormality, radiation treatment,

acute incidences of constipation or other disease process. Primary outcome measures included time to discharge, post-operative ileus, emergency room utilization within 2 months, and readmission. Opioid utilization was a secondary outcome.

**Results/Outcome(s):** Of these 860 patients, 31 had a confirmed diagnosis of CI and of these 31 patients, 8 were diagnosed with FM. A total of 23/31 patients with CI and 6/8 patients with CI and FM opted to undergo total abdominal colectomy as definitive treatment. Time to discharge for FM/CI patients had a mean length of stay of 7.5 days compared with 9.2 days for CI; 58.8% of CI patients and 16.7% of FM patients had an ileus; 52.9% of CI only patients and 0% of the CI/FM patients utilized the emergency department within 2 months of discharge and 52.9% of the CI only patients were readmitted while one FM/CI patient was readmitted for a UTI. The mean time to discontinuation of PCA was 3.2 days for the FM/CI and 6.3 days for the CI patients, respectively. Additionally, there was no statistical significance between the groups with regard to age, BMI, diagnosis of depression or rheumatoid arthritis. Those in the fibromyalgia group were more likely to be white.

**Conclusions/Discussion:** Colonic inertia patients with a diagnosis of FM who underwent surgical treatment had fewer complications and a faster discharge than CI patients without FM. A faster transition to oral post-operative narcotics and a decreased rate of readmission are noted. This study is limited by the small sample size. The mechanism for fibromyalgia and colonic inertia are not fully understood at this time. It is possible that both diagnoses share a common underlying factor which accounts for an incidence of almost 26% of patients with colonic inertia also being diagnosed with fibromyalgia.



## FIBER OPTIC HIGH-RESOLUTION COLONIC MANOMETRY IN PATIENTS WITH DIVERTICULAR DISEASE.

P454

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**Purpose/Background:** Diverticular disease is the most common morphologic abnormality of the large intestine, with a mortality of 2.5 per 100 000 population per year. The pathogenesis is still poorly understood and considered to be multifactorial. Abnormal colonic motility causing high intra-luminal pressure has been postulated as a cause. Previous low-resolution manometry studies have implicated increased segmental contractile activity in regions containing diverticula. However, low-resolution manometry has been shown to inaccurately assess colonic propagating motor patterns. This study aims to utilize fibre-optic high-resolution manometry to characterize the basal and stimulated colonic motility in patients with diverticular disease.

**Methods/Interventions:** After a bowel preparation and an overnight fast a solid state fibre-optic manometry catheter with 72 sensors spaced at 1cm intervals was placed colonoscopically in 20 patients with diverticular disease (11 female, mean age 61yrs, SD  $\pm$  11) and 14 normal controls (5 female, mean age 54yrs, SD  $\pm$  10.9). The catheter was clipped to the mucosa in the caecum. Colonic motor patterns were recorded for 2hrs prior to and after a 700kcal meal. Immediately after the study, an abdominal x-ray was taken to allow allocation of the manometric sensors to the anatomical part of the colon. Patients also completed a bowel symptom questionnaire.

**Results/Outcome(s):** At colonoscopy there were two patients with right-sided diverticula, 10 with left-sided, 6 with pancolonic and 2 with bilateral disease. Eight patients had a recent prior episode of diverticulitis. A normal colonic meal response was observed in 14 patients and in the remaining 6 there was no detectable increase in post-prandial colonic activity. There was no significant increase in colonic contractile activity in regions containing diverticula, when compared to similar regions in controls. Patients displayed an increase in postprandial fast antegrade long-single motor patterns compared with controls (6.2/hr  $\pm$  1.5 vs 1.7/hr  $\pm$  0.5,  $p = 0.01$ ). Median velocity was 37.21mm/sec, SD  $\pm$  8.92.

**Conclusions/Discussion:** The majority of patients with diverticular disease display normal colonic motor patterns and a normal response to a meal. A failed colonic response to a meal was not associated with symptoms of constipation or diverticula in any particular region. In this group of patients, a specific abnormal colonic motor pattern was not found to be associated with diverticular disease.

**APOLLO-1: RANDOMIZED, PLACEBO AND ACTIVE-CONTROLLED PHASE 3 STUDY INVESTIGATING OLICERIDINE (TRV130), A NOVEL  $\mu$  RECEPTOR G PROTEIN PATHWAY SELECTIVE ( $\mu$ -GPS) MODULATOR, FOR MANAGEMENT OF MODERATE TO SEVERE ACUTE PAIN FOLLOWING BUNIONECTOMY.**

P455

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**Purpose/Background:** Opioids are widely employed for the management of moderate to severe acute pain; however, opioid-related adverse events (ORAEs), including gastrointestinal dysfunction and respiratory depression, may limit dosing required for analgesic efficacy. In addition, time to onset of pain relief with conventional opioids is an important consideration for management of moderate-to-severe acute pain. Slow onset of pain relief can lead to excessive dosing and ORAEs. Conventional opioids bind to  $\mu$  receptors and non-selectively activate two intracellular signaling pathways: the G protein pathway, associated with analgesia; and the  $\beta$ -arrestin pathway, associated with ORAEs and inhibition of G protein-mediated analgesia. Oliceridine (TRV130) is a novel  $\mu$  receptor G protein Pathway Selective ( $\mu$ -GPS) modulator that activates G protein while causing low  $\beta$ -arrestin recruitment to the  $\mu$  receptor. In phase 2, oliceridine demonstrated the potential to produce analgesia rapidly, with an improved safety/tolerability profile vs morphine. Here we evaluated the efficacy and safety of oliceridine and morphine from the randomized, Phase 3 APOLLO-1 study.

**Methods/Interventions:** APOLLO-1 is a Phase 3, multicenter, randomized, double-blind, placebo- and active-controlled study. Patients (N=375) experiencing moderate-to-severe pain following bunionectomy were randomized into one of 5 treatment groups: IV oliceridine (1.5mg loading dose; 0.1mg, 0.35mg or 0.5mg demand doses), volume-matched placebo, or morphine (4mg loading dose; 1mg demand

doses) administered as needed by patient controlled analgesia (PCA) device. Etodolac was available as necessary for rescue analgesia. Pain intensity was measured using the 11-point numeric pain rating scale (NPRS) and the categorical pain relief scale (“none,” “a little,” “some,” “a lot,” “complete”) at baseline and at designated follow-up time points.

**Results/Outcome(s):** Results will be presented at the meeting (study ongoing).

**Conclusions/Discussion:** APOLLO-1 is the first Phase 3 trial examining the efficacy and safety of oliceridine in patients following hard/bony tissue surgery. Oliceridine is an investigational agent not approved by the FDA.

**THE FATE OF THE “SURGICAL POLYP”: DO POLYPS REFERRED FOR SURGERY REALLY NEED TO BE RESECTED?**

P456

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**Purpose/Background:** Large colorectal polyps are relatively common findings during colonoscopy. They can be managed endoscopically or surgically, but removal is important to both exclude and prevent cancer. Referrals for surgical resection of colorectal polyps may be unnecessary, and unnecessary colectomy puts the patient at risk of morbidity and mortality that could be avoided. We have performed a retrospective review of the experience of a surgical endoscopist in receiving and evaluating patients referred for surgical resection of an apparently benign colorectal polyp. We hypothesized that most colorectal polyps referred for surgery can be managed safely endoscopically.

**Methods/Interventions:** All patients referred for surgical resection of a benign colorectal polyp >2cm maximum diameter from 1995-2016 were entered prospectively into a database. Details about the patient (age, gender), the polyps (endoscopic size, location, pathology) and

**P456 Patient Characteristics**

	Resection Group (n=59)	Polypectomy Group (n=375)	p
Age	70.2 ( $\pm$ 13.3)	66.4 ( $\pm$ 11.6)	>0.05
Gender	20 Male 29 Female	214 Male 161 Female	0.315
Polyp Size	46.7 ( $\pm$ 19.7)	38.1 ( $\pm$ 17.1)	0.03
Polyps Location	Right: 30 Left:19 Rectum:10	Right: 213 Left: 74 Rectum: 35	0.0374
Cancer	12	3	<0.0001
Persistent /Recurrent polyp	10 (16.9%)	52 (13.9%)	>0.05
Complications	5 (8.4%)	30 (8%)	>0.05

ultimate treatment (endoscopic, surgery) were abstracted. Polypectomies were performed by conventional snare excision. 80% were piecemeal.

**Results/Outcome(s):** 434 patients were identified. 59 (13.6%) ultimately required surgery for their polyp. The table gives polyp size and location according to the fate of the colon. Of the 59 in the surgery group, 12 had cancer diagnosed from the index polypectomy specimen. 2 did not have surgery because they declined or were lost to follow-up. The remaining 10 malignant polyps were operated. Of these 10, 3 had no residual adenocarcinoma on final pathology, 1 had no invasive component but a tubular adenoma, 1 had stage III disease (T0 but N1), the remaining 5 were all stage II. 47 of the resected polyps were initially benign. However 3 patients developed carcinoma at the polypectomy site on follow-up (all Stage I) while 13 had high grade dysplasia and an uncertain endoscopic clearance. 4 resections were performed for recurrent/persistent benign polyp and 27 had benign polyps of awkward position (e.g. Ileocecal valve) or large size (>100mm). The patient with cancer who declined resection died of metastatic disease. The other 13 cancer patients are alive with no evidence of disease.

**Conclusions/Discussion:** All patients referred for surgery for a colorectal polyp should first be colonoscoped by an expert therapeutic endoscopist.

#### LOWER GASTROINTESTINAL ENDOSCOPY PROVISION IN 37 MILITARY HOSPITAL, ACCRA-GHANA: AN AUDIT OF PRACTICE TO VALIDATE SERVICE DEVELOPMENT.

P457

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**Purpose/Background:** Quality of lower gastrointestinal endoscopy is essential because of the implications on the diagnosis of gastrointestinal pathology and their treatment. Therefore, it is important not only to document the number of cases performed in a unit but also the quality of these examinations. Recent studies have assessed the quality of endoscopy but mainly in developed countries. However, few studies looked at the standards in the African continent. The purpose of retrospective study was to assess the quality of colonoscopy in a military hospital based in Ghana. The study provides a platform for recommending standards of practice and methods for achieving safe high quality colonoscopy.

**Methods/Interventions:** Retrospective data collection in 37 Military Hospital in Ghana, period studied from September 2011 to September 2015 (213 weeks). Data analysed included age, sex, type of endoscopic examination performed, indication, findings and completion data.

**Results/Outcome(s):** During the period studied 974 endoscopic procedures were performed (514 colonoscopies, 316 proctosigmoidoscopies, 59 flexible sigmoidoscopies and in 74 patients procedure performed was not documented. Population studied included 276 females (27.4%) and 691 males (72.6%), median age of population was 51 years (range from 17 to 97 years). In the colonoscopy group the median age was 57 years (range from 17 to 93 years), sex distribution was 173 females (33.6%) and 338 males (66.3%). In the colonoscopy group there was a wide range of indications, the majority followed the guidance of BSG such as fresh or altered rectal bleeding, change in bowel habit and iron deficiency but in some patients there weak indications (13.6%) for the test such as ascites, bowel obstruction, raised ESR. Regarding extension of bowel examined, caecal intubation rate was 12%. In 47.7% of the colonoscopies the extent of bowel examined was not documented. The pickup rate of colorectal cancer was 3.9% and for polyps 1.75%.

**Conclusions/Discussion:** This audit shows that in this centre there is a wide variety of indications for colonoscopy. There is low pick up rate of cancerous lesions and polyps. There is a low caecal intubation rate. As a result of this audit training in colonoscopy technique should be performed, more attention given to indications and better recording of the data collected. There is a plan for re-audit once recommendations have been implemented.

#### WHAT IS THE INCIDENCE OF INCISIONAL HERNIA IN A POPULATION OF PATIENTS WITH TYPE 2 AND 3 INTESTINAL FAILURE?

P458

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**Purpose/Background:** Incisional hernia (IH) formation has an incidence of 10% following laparotomy. Hernias occur more frequently after abdominal infections and multiple surgeries, such as in patients with type 2 and 3 intestinal failure (IF). Enterocutaneous fistulae (ECF) are also common in this population. The incidence of IH and/or ECF amongst this population has never been quantified. This study aims to evaluate the demand for abdominal wall reconstruction in an IF population.

**Methods/Interventions:** Evaluation of a prospectively maintained clinical database recording all patients who attend our institution for parenteral nutrition (PN) for IF from 2011-16 was performed. Clinical records were then retrospectively reviewed. Data were collected for underlying cause of IF, details of prior surgery, presence of IH, presence of ECF and long-term survival.

**Results/Outcome(s):** 450 patients were identified over the study period. 385 had abdominal surgery prior to diagnosis of IF (Table 1). 76 (19.74%) had an IH. Of

those with IH, 55.3% also had an ECF, significantly more than those with no IH and ECF (25.6%;  $p < 0.001$ ). On subgroup analysis, IH was significantly more likely to be found in patients with IF resulting from surgical complication than in any other group (36.2%;  $p < 0.001$ ). This group also had a higher rate of ECF developing along with IH (68.1%). This was not significantly different to other groups ( $p = 0.17$ ). Within this, sub-group survival on PN was not significantly different in patients who developed an IH versus those who had no IH (1-year = 86% with IH vs 83% without IH; 5-year = 80% with IH vs 72% without IH (log rank 0.5;  $p > 0.1$ )).

**Conclusions/Discussion:** The incidence of IH in patients with IF due to previous surgery is double the reported level. Subgroup analysis revealed this increased risk is confined to patients who develop IF as a result of surgical complication. All other groups do not significantly differ from reported levels. Long-term survival is not affected by the presence of IH at the time of referral to our centre. These findings reinforce the need for specialist abdominal wall reconstructive surgeons in the management of IF patients.

#### LAPAROSCOPIC MESH VENTRAL RECTOPEXY AT A SINGLE CENTRE.

P459

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**Purpose/Background:** Rectal prolapse is an important cause of obstructed defecation, extremely debilitating symptoms of pain & discomfort of prolapsing tissue, mucus discharge, rectal bleeding, faecal incontinence or difficult evacuation. Laparoscopic ventral rectopexy has evolved as a treatment modality in Europe to treat full-thickness rectal prolapse over open rectopexy. This procedure has been shown to achieve acceptable anatomic results with

low recurrence rates, few complications, and improvements of both constipation and faecal incontinence. The aim of the study is to assess the outcomes of laparoscopic ventral rectopexy at a single centre.

**Methods/Interventions:** This is a retrospective study on all laparoscopic ventral rectopexy carried out since 2012 at East Cheshire NHS Trust. Preoperative and post operative QOL was assessed using the East Cheshire "Pelvic Floor Unit Quality of Life QOL" survey, a modified Wexner faecal incontinence grading system. The aim of the study is to access feasibility, efficacy and its impact on change on QOL following laparoscopic ventral rectopexy.

**Results/Outcome(s):** Laparoscopic Ventral Rectopexy (=52) Age (yrs): 60.1±1.8 Sex (M:F): 1:51 Body Mass Index: 24.9±0.6 Complications (n): 4 Mortality (n): 1 Operation time (mins): 140.2±6.2 Length of stay (days): 3±1 Readmission (n): 1 Biological Mesh (n): 44 Non biological Mesh (n): 8 Conversion to open (n): 1

**Conclusions/Discussion:** Laparoscopic ventral rectopexy is a safe procedure with low mortality rate, shorter hospital stay and few complications. The outcome of surgery as measured by the East Cheshire Pelvic Flow QOL survey showed improvement of obstructive defecation symptoms.

#### RUPTURE OF SUPERIOR MESENTERIC ARTERY ANEURYSM IN DESMOID PATIENTS.

P460

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**Purpose/Background:** Rupture of a superior mesenteric aneurysm (SMA) is a rare but potentially lethal complication in patients with familial adenomatous polyposis and desmoid disease. We have cared for three patients with this complication and report our experience to emphasize its lethality.

**P458 Table 1: Incidence of IH across all patients and by cause of intestinal failure and number of patients with ECF and IH.**

Cause of intestinal failure	Number of patients (% of total)	Abdominal surgery		
		prior to referral, n (% of cohort)	Presence of IH, n (% of cohort)	Presence of IH with ECF, n (% of cohort)
Surgical complication	130 (28.9)	130 (100)	47 (36.4)	32 (68.1)
Inflammatory bowel disease	101 (22.4)	98 (97)	13 (13.3)	6 (46.2)
Malignancy	38 (8.4)	31 (81.6)	1 (3.2)	0 (0)
Mesenteric infarct	73 (16.2)	73 (100)	9 (12.3)	2 (22.2)
Pseudoobstruction	45 (10)	10 (22.2)	1 (10)	0 (0)
Radiation enteritis	17 (3.8)	15 (88.2)	2 (13.3)	1 (50)
Volvulus	6 (1.3)	6 (100)	1 (16.7)	0 (0)
Other	40 (8.9)	22 (55)	2 (9.1)	1 (50)
All	450 (100)	385 (84.7)	76 (19.7)	42 (55.3)

**Methods/Interventions:** We reviewed the patients with mesenteric desmoid tumors in our desmoid registry. Out of 185 patients with intraabdominal desmoid disease there were three cases of rupture of SMA aneurysm in the setting of growing desmoid tumors. These cases are described here.

**Results/Outcome(s):** The three cases are summarized in the table. Patients 1 and 3 had undergone total proctocolectomy for their polyposis and patient 2 had an ileorectal anastomosis. Two of the patients had Stage IV desmoid disease and the other stage III. Each of them had chemotherapy as part of the treatment. The time from age of diagnosis of desmoid disease to diagnosis of the aneurysm was 62 months, 11 months and 130 months for patients 1, 2 and 3. Each of the patients was critically ill as a result of complicated of the aneurysm and one patient died. Patients 2 and 3 ruptured acutely and needed emergency treatment to control the rupture.

**Conclusions/Discussion:** SMA is an uncommon but potentially lethal condition on mesenteric desmoid tumors in FAP. Diagnosis of an SMA aneurysm in such patients should prompt urgent referral to vascular surgery.

**OUTCOMES FOR PROVOCATIVE ANGIOGRAPHY FOR MANAGEMENT OF LOWER GASTROINTESTINAL BLEEDING (LGIB).**

P461

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**Purpose/Background:** Localization of LGIB is challenging when hemorrhage is sporadic, because diagnostics are ineffective during periods of quiescence. To address this difficulty, provocative angiography (PA) uses

pharmacologic anticoagulation/thrombolysis to induce bleeding in a controlled setting so a source can be localized and controlled. PA remains controversial due to concerns over procedural risk and because of limited outcomes data. The purpose of this study is to review the PA experience from two tertiary centers within a single hospital system.

**Methods/Interventions:** Patients evaluated between 2006 and 2016 were retrospectively identified by applying keyword searches to a prospectively maintained institutional database. Data was then abstracted by electronic medical record review. Patients recruited had a diagnosis of “obscure” LGIB: LGIB of uncertain or unknown etiology despite prior extensive evaluation. PA procedures were performed under sedation, with available surgical backup. Systemic heparin was intravenously infused, and tissue plasminogen activator (tPA) was sequentially injected into selected arterial branches, including at least the celiac, superior mesenteric and inferior mesenteric arteries. 15 patients (60%) also received intra-arterial nitroglycerin or papaverine.

**Results/Outcome(s):** 25 patients (19 males) with a mean age of 65.4 (range 17-90) years had a diagnosis of “obscure” LGIB, and had previously undergone a mean of 6.4 (range 0-16) studies including nuclear bleeding scan, non-provocative visceral angiography, upper and lower endoscopy, double balloon enteroscopy or capsule endoscopy. Pre-PA computed tomography (CT) imaging was performed in a minority (N=7) of patients. The mean nadir pre-PA hemoglobin was 6.8 (range 4-10.5) g/dL and mean prior transfusion volume was 7.8 (range 0-21) units. Bleeding was localized and embolized in 3 patients (12%) leading to definitive control in 2 patients; there were no reported procedural complications. The other patient re-bled and underwent exploratory laparotomy with small bowel resection for bleeding jejunal diverticulosis. Among patients with negative PAs (88%), most continued to

**P460 Summary of the 3 cases**

Patient	Gender	Age at diagnosis of desmoid disease	Symptoms of Aneurysm	Presentation and treatment	Outcome
1	M	24	Back pain	Endovascular stent/ later enterectomy and attempted small bowel transplant	Failed transplant, duodenostomy, TPN
2	F	35	Liquefaction of desmoid showed aneurysm on CT scan	Acute rupture Endovascular stent	Continued bleeding, expired
3	F	23	Back pain	Acute rupture Endovascular stent	Ischemic pouch, enterocutaneous fistula, repaired. Pouch recovered

have episodic bleeding (65%), and 5 ultimately required surgical exploration. All 5 of these patients had small bowel pathology (arteriovenous malformation, angiodysplasia, ectasia) that was either resected (N=4) or oversewn through an enterotomy (N=1).

**Conclusions/Discussion:** PA may be safely performed without significant risk of post-procedural complication. Despite its low rate of vessel identification, PA should be considered in patients who have exhausted less invasive diagnostic modalities or who have high operative risk.

### EARLY PERCUTANEOUS DRAINAGE FOR HINCHEY IB AND II ACUTE DIVERTICULITIS MAY IMPROVE OUTCOMES.

P463

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**Purpose/Background:** The role of percutaneous drainage in Hinchey Ib and II acute diverticulitis with abscess is controversial. No objective size criteria necessitating drainage exist nor is there agreement on the need for percutaneous drainage. We hypothesize that outcomes for mild acute diverticular abscesses can be optimized by the early use of aggressive drainage.

**Methods/Interventions:** A single-insitution retrospective review of all Hinchey Ib and II diverticulitis cases during 2012-2014 was conducted. Demographics included age, gender, comorbidities, laboratory profile, sepsis criteria, imaging findings (abscess size, location, pneumoperitoneum), and triage at admission (conservative management with antibiotics and percutaneous drainage vs. surgery). Interventional Radiology (IR) consultations were obtained on all patients except those taken directly to surgery and those whose initial CT scan final radiologist report stated the abscess was not amenable to percutaneous drainage. Primary outcomes included length-of-stay (LOS), morbidity, and mortality. Secondary outcomes included operative outcomes of same-admission versus delayed surgery including need for stoma and leak rates. Data was analyzed by Student's t-test or Chi Square test with  $\alpha \leq 0.05$  denoting statistical significance.

**Results/Outcome(s):** A total of 134 patients met inclusion. Of these, 104 patients (78%) underwent successful conservative treatment while 30 patients (22%) required same-admission surgery. Three patients went for emergent surgery (<24 hours), whereas 27 patients went to surgery after failed conservative management. Both groups were similar at baseline for age, sex, comorbidities, and %sepsis ( $p>0.1$  for each). Abscess drainage was performed in 19 patients (18%) of the conservative group vs. 2 patients (7%) of the surgical group. Table 1 describes anatomic location, size of the abscesses, and reasons abscesses were not drained. Comparing secondary outcomes of

conservative treatment followed by elective surgery vs. emergent surgery, more patients in the conservative group received IR drainage on their initial presentation (40 vs. 7%,  $p=0.01$ ). Conservative management with outpatient surgery resulted in more laparoscopic surgeries (30 vs. 3%,  $p=0.01$ ) and lower rate of stoma formation (0 vs. 67%,  $p<0.01$ ). The conservative group also had a shorter ICU LOS (0.01 vs. 1.3 days,  $p=0.04$ ) and days without oral diet (3.0 vs. 8.5 days,  $p=0.001$ ). There were no other significant differences noted in outcomes.

**Conclusions/Discussion:** Elective surgery following episodes of Hinchey Ib or II diverticulitis results in increased use of laparoscopy, decreased rates of stoma use, ICU LOS, and days without oral diet compared to emergent surgery. We found no anatomic reason why IR tended to not drain abscesses. Encouraging IR colleagues to perform early drainage may obviate the need for emergent surgery and should be considered in the management strategy of these patients.

	Conservative 104 patients	Emergent Surgery 30 patients	P Value
<b>Total Patients</b>			
<b>Abscess Locations on CT (%)</b>			
Paracolic	52%	47%	0.61
Intramural	4%	0%	0.28
Interloop	2%	3%	0.65
Antevesicular/Retrouterine	10%	13%	0.55
Retrovesicular/Anterior to Rectum	6%	10%	0.41
Paracolic Gutters	7%	3%	0.49
Extracolonic (Solid Organ/Extracavitary)	1%	0%	0.59
Multiple Locations/Diffuse			
Fluid	19%	23%	0.62
<b>IR Triage at Admission</b>			
Got IR Consult (%)	62%	93%	0.01
Mean Abscess Size (cm)	3.9 (2.6-5.0)	4.3 (2.9-5.0)	0.85
<b>Reason Abscess Not Drained</b>			
Too Small	38%	23%	0.15
No Safe Window	23%	30%	0.44
Improving Clinically	10%	10%	0.95
Combination	8%	7%	0.85

Data is represented as mean (standard error of the mean) or percentages, respectively (P value by unpaired Student's t-test or Chi Square)

### THE ROLE OF INTESTINAL LENGTHENING IN ADULTS WITH TYPE 3 INTESTINAL FAILURE: RESULTS FROM A NATIONAL PROGRAMME.

P464

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**Purpose/Background:** Therapies for type 3 (chronic) intestinal failure beyond home parenteral nutrition (HPN) are limited. Intestinal lengthening is an established surgical therapy in children resulting in nutritional independence in up to 90% of cases. The worldwide experience in adults is very limited. In 2013, the National Health Service England established a national programme for adult intestinal lengthening at Salford Royal Hospital. This study aimed to determine the role of intestinal lengthening in the management of adults with type 3 intestinal failure.

**Methods/Interventions:** Patients referred to the two national intestinal failure units in England were screened

until September 2016. Exclusion criteria were HPN <2yrs, residual small bowel length <20cm, intestinal dysmotility, active Crohn’s disease or malignancy, scleroderma or connective tissue disease, previous radiotherapy and contraindications for major surgery. Eligible patients were further assessed at institutional and national case conferences and surgery offered if appropriate.

**Results/Outcome(s):** 379 patients receiving >2 years TPN at the two national intestinal failure units were screened. 353 (93.1%) met exclusion criteria at screening (including 73 (19.3%) cases of dysmotility, 51 (13.5%) cases awaiting reconstructive or other procedures, 50 (13.2%) cases with active Crohn’s disease, 45 (11.9%) medically unfit for surgery, 32 (8.4%) active malignancy, 20 (5.3%) ultra-short bowel (<20m), 13 (3.4%) cases following recent surgery, 12 (3.2%) scleroderma or connective tissue disease, 12 (3.1%) radiation induced colitis and 11 (2.9%) documented prohibitively hostile abdomen, 8 (2.1%) who had had undergone or were awaiting SB transplant). 26 patients were further assessed at institutional and national case conferences and surgery offered if appropriate. Further outcomes of our experience to date are presented.

**Conclusions/Discussion:** Intestinal lengthening in adults is seldom undertaken but is a potentially appropriate strategy for a well-defined group of some 6.8% of people on long term HPN.

**WHO’S AFRAID OF THE BIG BAD SCOPE? A STUDY OF FEAR AND ANXIETY IN PATIENTS AWAITING COLONOSCOPY.**

P465

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**Purpose/Background:** Colonoscopy is a traumatic event in the lives of patients, who sometimes arrive for their appointment in a state of high anxiety. This may impact the conduct of their exam by increasing the level of sedation required, or decreasing the patient’s tolerance of the procedure itself. We performed this study to document the state of mind of patients coming for elective, outpatient colonoscopy.

**Methods/Interventions:** A questionnaire was designed to measure the degree of fear and anxiety in patients about to undergo colonoscopy. Each was assessed on a 10 point linear analog scale. In addition patients were asked the reason for their fear/anxiety. After the examination

patients were asked about the pain they experienced during the exam (10 point scale), whether the experienced was what they had anticipated, and whether they would return for another exam. A consecutive series of patients presenting for elective outpatient colonoscopy were approached to enter the study. After informed consent the questionnaire was administered before and after the colonoscopy.

**Results/Outcome(s):** There were 119 patients, 65 men and 54 women. Average age was 66 years (median 67, range 39 to 90), men 69 (46-90) and women 64 (39-86). 11 were colonoscopy naïve and 106 had previously had a scope (mean 2.4). The table shows the levels of fear and anxiety; very few patients had high levels (7 and above). A regression analysis of fear and anxiety showed a significant relationship (R2=0.646, p<0.0001). Patients who were really scared (7-10 fear score) has more pain (4.7 vs 2.7, p0.0065) while for those who were really worried the difference was not significant (4.1 vs 2.8, p0.1515). Anxiety did not affect willingness to have another exam. Reasons for fear included “what might be found” (17), and issues with sedation and pain (6). Reasons for anxiety included “what might be found” (8), bad prior experience (5), possible mistake/complication (5) and issues with sedation (4).

**Conclusions/Discussion:** Although limited by the relatively experienced cohort of patients, our study shows that fear and anxiety exist in patients having colonoscopy, and that high levels of these emotions impact patient experience. Colonoscopists should be alert to the mental state of the patients they examine.

**THE IMPORTANCE OF MULTIDISCIPLINARY SURGERY IN THE MANAGEMENT OF DEEPLY INFILTRATIVE ENDOMETRIOSIS.**

P466

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**Purpose/Background:** Endometriosis is a chronic disease which is described by the presence of endometrial glands outside the uterine cavity, and it can also rarely affect the intestinal tract. In this study, our aim was to compare the relationship of this gynecological disease with colorectal surgeons, and outcomes of the patients who require gastrointestinal resections.

**Methods/Interventions:** Between 2010 and 2016, a total of 28 cases in which colorectal surgeons were

**P465 Levels of Fear and Anxiety**

	Mild	Mild	Mild	Moderate	Moderate	Moderate	Severe	Severe	Severe	Severe
	1	2	3	4	5	6	7	8	9	10
Fear	76	14	8	3	2	2	4	3	2	1
Anxiety	67	22	10	4	3	2	5	2	1	0



involved due to deep infiltration of gastrointestinal tract were included to the study group. Data analyzed retrospectively. The main outcomes were surgical technique, postoperative outcomes and complications.

**Results/Outcome(s):** There were a total of 28 patients in the study. The mean age was 40,4 (range: 26 - 58). In 4 patients, colorectal surgeons were the primary surgeons due to the rectosigmoid narrowness, and in the remaining 24, colorectal surgeons were involved after preoperative consultation. Twenty four of the cases were performed laparoscopically. Four cases converted to open approach. The patients with rectum involvement underwent low anterior resection. These 6 patients' surgeries were performed laparoscopically. A total of 8 patients with sigmoid involvement underwent anterior resection. All of these patients underwent laparoscopic anterior resection. There were no postoperative complications and mortality.

**Conclusions/Discussion:** Endometriosis is a common disease which affects 15% of women in the reproductive age that leads to chronic pelvic pain and infertility. Deep infiltrative disease usually affects distal sigmoid colon and rectum that requires surgery of the colon. These patients should be managed by multidisciplinary teams and prepared thoroughly prior to surgery.

#### THE CLINICAL FEATURES AND THE FACTORS ASSOCIATED WITH COMPLICATIONS IN THE PATIENTS WITH COLONIC DIVERTICULITIS.

P467

J. Yun

*Guri-si, Korea (the Republic of)*

**Purpose/Background:** Colonic diverticulitis is uncommon in Korea, but the incidence is rapidly increasing. The clinical features and the factors associated with complications of diverticulitis are important to treat the disease.

**Methods/Interventions:** A retrospective review was conducted of the prospectively collected medical records of 524 patients with diverticulitis between October 2007 and September 2016.

**Results/Outcome(s):** The median patient age was 42 years (range 11 to 87 years) and 235 (44.8%) were female. Although diverticulitis more frequently affected the right colon (483 patients, 92.2%), the age was higher in the patients with left colonic diverticulitis (mean, 41 vs 57 years,  $p<0.001$ ). Of the 524 patients, 42 (8.0%) developed complications, including abscess formation, perforation, and/or fistula, some of which required surgical treatment. The percentage of complicated diverticulitis is higher in the patients with left colonic diverticulitis compared with right diverticulitis (56.1% vs 3.9%,  $p<0.001$ ). Factors associated with complications were involvement of the left colon, older patients, and history of recurrent diverticulitis.

**Conclusions/Discussion:** The incidence of right colonic diverticulitis is higher in Korea, but the rate of complications seems higher in elderly patients with left colonic diverticulitis. Recurrent diverticulitis is risk factor of complication, and may be thoroughly considered for surgical treatment.

#### COMPARISON OF PERIOPERATIVE OUTCOMES AND COST BETWEEN DA VINCI ® XI AND SI SYSTEMS IN PATIENTS WHO UNDERWENT ROBOTIC COLORECTAL SURGERY.

P468

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**Purpose/Background:** The da Vinci ® Si system is designed to work better in the pelvis and requires repositioning the entire platform to work multiple quadrants in the setting of colorectal surgery. In 2014, a new platform the da Vinci ® Xi system was marketed to address a few limitations of its predecessor. While it addressed limitations of the previous platform, the technology is still in its infancy. In the current study, we aimed to compare perioperative outcomes, direct and surgical cost between da Vinci ® Xi and Si systems in patients who underwent robotic colorectal surgery.

**Methods/Interventions:** Patients who underwent robotic colorectal surgery between 01/2014 and 05/2016 were identified from an IRB-approved, prospectively maintained institutional database and reviewed. Patients were classified into two groups: da Vinci Xi and Si systems. Da Vinci Xi system was introduced to our department in 10/2015. Demographics, patient characteristics and short-term complications were compared between two robotic platforms.

**Results/Outcome(s):** A total of 130 patients were identified during the study period. There were 29 (22.3%) patients in the da Vinci Xi and 101 (77.7%) in the da Vinci Si groups. Groups were comparable in terms of age ( $59.0\pm 13.6$  vs  $60.3\pm 14.9$  years,  $p=0.28$ ), female gender [18 (62.1%) vs 55 (54.5%),  $p=0.82$ ], body mass index ( $27.4\pm 5.5$  vs  $27.6\pm 6.1$  kg/m<sup>2</sup>,  $p=0.81$ ), cardiac morbidities [9 (41.0%) vs 49 (49.0%),  $p=0.82$ ], diabetes mellitus [3 (15.7%) vs 8 (8.0%),  $p=0.24$ ], type of surgical procedure ( $p=0.50$ ), diagnosis ( $p=0.11$ ) and other preoperative characteristics. Conversion to open rates were comparable between the da Vinci Xi and da Vinci Si groups [1 (3.6%) vs 9 (8.9%),  $p=0.92$ ]. Operative time ( $269\pm 97$  vs  $289\pm 99$  minutes,  $p=0.23$ ) and length of hospital stay ( $4.1\pm 2.9$  vs  $5.1\pm 4.4$  days,  $p=0.55$ ) were comparable between the groups. Overall morbidity, postoperative ileus, urinary retention, reoperation, deep vein thrombosis, urinary tract infection and anastomotic leak rates were comparable between the groups. Overall hospital and surgical costs were comparable between the groups. (Table).

**Conclusions/Discussion:** Da Vinci Xi robotic system appears to be feasible and safe for colorectal procedures with similar outcomes and potentially shorter counsel time.

### COLONOSCOPY FAILURE AFTER ACUTE SIGMOID DIVERTICULITIS.

P469

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**Purpose/Background:** A colonoscopy is routinely recommended after an episode of diverticulitis to exclude neoplasia or inflammatory bowel disease. To our knowledge, the rate of incomplete colonoscopy (failure to reach the cecum) performed after acute diverticulitis has not previously been reported in the literature but is thought to be higher than in screening colonoscopy. The aim of this study is to estimate the rate of incomplete colonoscopies after acute sigmoid diverticulitis and evaluate associated risk factors.

**Methods/Interventions:** A retrospective review of all patients from two institutions databases who underwent an interval colonoscopy after acute diverticulitis was performed with IRB approval (from March 2006 to July 2015 in UIC and from February 2013 to September 2016 in Cook County Hospital). Inclusion criteria included colonoscopy as follow-up after an episode of acute sigmoid diverticulitis and age  $\geq 18$  years. Colonoscopies were performed by colon and rectal surgeons, gastroenterologists and supervised residents. Variables analyzed included age, body mass index (BMI), gender, American Society of Anaesthesiologists (ASA) class, Hinchey score at last

acute diverticulitis, time interval between last acute diverticulitis and colonoscopy, number of prior episodes, history of percutaneous abscess drainage and previous abdominal surgeries. Patients were divided into two groups: patients with complete colonoscopy reaching the cecum (CC) and those with incomplete colonoscopy (IC).

**Results/Outcome(s):** 140 patients underwent a colonoscopy after an episode of acute diverticulitis were identified. Overall, the incidence of colonoscopy failure after acute diverticulitis was 17% (24/140). A sigmoid cancer was found in one IC patient. On univariate analysis, IC was associated with female gender, complicated diverticulitis (Hinchey stage 1 and 2), patients undergoing the procedure less than 6 weeks after their last attack, and previous percutaneous abscess drainage (see Table). On multivariate regression analysis, female gender, complicated diverticulitis (Hinchey stage 1 and 2), patients undergoing the procedure less than 6 weeks after their last attack remained independently significant ( $p < 0.001$ ). Age, BMI, ASA score, previous abdominal surgeries and the number of previous episodes of diverticulitis were not significantly associated with colonoscopy failure.

**Conclusions/Discussion:** This study demonstrates a significant rate of incomplete colonoscopies after acute sigmoid diverticulitis. The study supports waiting at least 6 weeks with follow-up colonoscopy after acute diverticulitis. Female patients and patients with other risk factors should be informed about the increased risk for IC.

### P468 Comparison of specific postoperative complications and hospital costs between the da Vinci Xi and da Vinci Si groups

	da Vinci Xi (N=29)	da Vinci Si (N=101)	P value
Overall morbidity, n(%)	10 (34.5)	26 (25.7)	0.35
Ileus, n(%)	3 (10.3)	13 (12.9)	0.74
Urinary retention, n(%)	2 (6.9)	8 (7.9)	0.70
Hemorrhage, n(%)	0 (0.0)	2 (2.0)	>0.99
Anastomotic leak, n(%)	0 (0.0)	1 (1.0)	>0.99
Small bowel obstruction, n(%)	0 (0.0)	2 (2.0)	>0.99
Surgical site infection (organ space), n(%)	1 (3.4)	1 (1.0)	0.39
Deep vein thrombosis, n(%)	0 (0.0)	1 (1.0)	>0.99
Readmission, n(%)	4 (13.8)	4 (3.9)	0.07
Reoperation, n(%)	2 (6.9)	3 (3.0)	0.30
Overall direct cost *	1.0 $\pm$ 0.32	1.13 $\pm$ 0.44	0.24
Surgical services cost*	1.0 $\pm$ 0.38	1.11 $\pm$ 0.29	0.06
Nursing services cost*	1.0 $\pm$ 0.69	1.20 $\pm$ 1.10	0.98
Pharmacy services cost*	1.0 $\pm$ 0.60	1.30 $\pm$ 1.20	0.52

\* Actual cost values are not presented due to our institution's cost privacy policy. Presented cost value was the ratio between the actual mean cost with standard deviation divided by actual mean cost of the da Vinci-Xi platform.

## RANDOMIZED CONTROLLED TRIAL OF PROBIOTIC USE FOR POST-COLONOSCOPY SYMPTOMS.

P470

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**Purpose/Background:** Approximately 20% of people undergoing colonoscopy report persistent pain, bloating or altered bowel function for a prolonged period after their procedure. This is multifactorial in etiology, however the change in gut flora after bowel preparation has been suggested as a potential mechanism. A previous study has shown a reduction in duration of post-colonoscopy discomfort with probiotic use, we are interested to see if this improvement remains when the colonoscopy is performed with CO<sub>2</sub> insufflation in lieu of air. Our primary aim is to

determine whether oral probiotic use after colonoscopy improves post-procedural abdominal pain, discomfort and bloating. Our secondary aim is to determine whether oral probiotic use after colonoscopy shortens duration of return to normal bowel function.

**Methods/Interventions:** This is a randomised, double-blind, placebo-controlled trial. Assuming the rate of post-colonoscopy abdominal pain to be around 20% at 24h in our population, and a 50% reduction in pain to be clinically relevant, we predicted that a sample size of 145 patients in each arm would be sufficient to identify a significant difference if present (80% power with a type I error rate of 5%). The treatment is probiotic '*bifidobacterium* and *lactobacillus acidophilus*'. This and the placebo were provided in identical containers and stored refrigerated, marked as either FP or FP1. A computer generated block randomization sequence was generated and

### P469 Incomplete Colonoscopy following Acute Diverticulitis

	Complete (n=116)	Incomplete (n=24)	P value
Age (years)	49 ± 12	53.1 ± 12	0.09
Mean ± SD	46.5 (21-79)	54.5 (34-81)	0.12
Median (range)			
Male patient (%)	66 (57)	8 (33)	0.0353*
BMI			0.38
Mean ± SD	31.9 ± 6.7	33 ± 9.0	0.60
Median (range)	28.8 (18-52)	28.2 (17-58)	
ASA (%)			0.26
I	21 (18)	6 (25)	
II	82 (71)	13 (54)	
III	13 (11)	5 (21)	
IR Intervention (%)	9 (8)	7 (29)	0.0027*
Previous Abdominal Surgery (%)	50 (43)	10 (42)	0.9
Hinchey (%)			0.001*
0	75 (65)	5 (21)	
1	30 (25)	12 (50)	
2	10 (9)	7 (29)	
3	1 (1)	0	
Interval between last diverticulitis episode and colonoscopy (%) <sup>a</sup>	15 (13)	10 (42)	0.001*
< 6 weeks	99 (85)	14 (58)	
> 6 weeks			
Number of prior episodes (%)			0.12
1	78 (66)	12 (50)	
> 1	38 (33)	12 (50)	
Reasons for failure (%)	N/A	10	N/A
Sigmoid stricture		5	
Sigmoid angulation		3	
Acute inflammation		2	
Patient intolerance		4	
Not reported			

<sup>a</sup> Date of last episode was missing for 2 patients

the participants were allocated consecutively to receive FP or FP1. All participants underwent standard bowel preparation (1 Glycoprep and 2 picoprep), and underwent colonoscopy (using carbon dioxide) by conjoint committee recognized specialists. They all were given a questionnaire to document both their pre- and post-procedure symptoms. Treatment was taken from the evening of colonoscopy onwards for 14 days and symptoms were documented daily. The questionnaire was then returned to the department and the data collated into a spreadsheet.

**Results/Outcome(s):** Recruitment commenced in September of 2016 and complete data have been compiled for the first 11 patients. We plan to complete data collection by April 2017 for analysis and submission.

**Conclusions/Discussion:** If a significant difference is again demonstrated, this would provide an insight into the potential mechanism for post-colonoscopy pain, bloating and bowel habit alteration. In addition, it suggests a route for improvement of these symptoms facilitating a more pleasant patient experience and possibly improving compliance with further colonoscopy or treatment recommendations.

#### RECTAL FOREIGN BODY - CASE REPORT.

P472

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**Purpose/Background:** Hospital presentation with foreign body retained in the rectum is occasionally observed in the emergency department (ER). Previous reports demonstrated that it is seen more frequently in male of 3<sup>rd</sup> or 4<sup>th</sup> decades. Various objects are presented with different size and shape. Based on thorough evaluation, plan for management can be delineated. In this article, we present the cases with retained foreign body in the rectum.

**Methods/Interventions:** we present the 4 cases with retained foreign body in the rectum.

**Results/Outcome(s):** Case 1. A 50-year-old male presented in the ER, complaining inability to remove cylindrical plastic bottle in the rectum after 4 hours of initial insertion. On physical examination, anal bleeding as well as laceration was seen; however, abdominal symptom, such as pain, was not evident. Considering the size and shape, endoscopic removal was not possible. Under general anesthesia, transanal manual removal was attempted in lithotomy position. Postoperative colonoscopy showed no perforation site in the rectum, only two small lesions with mild erosion. Case 2. A 51-year-old male presented in the ER, complaining severe abdominal pain for 10 hours just after awakening from drunken state. On physical examination, no sign of peritoneal irritation was observed. On the radiologic examination, cylindrical object in the rectum sized 9.5cm by 6.5cm was detected. Under the general anesthesia, the foreign object was removed transanally

using rectal retractor in lithotomy position. Case 3. A 54-year-old male came to the ER due to persistent anal pain after inserting a bottle of soy milk in 7 hours before. Grossly, any perianal wound was not observed. On the digital rectal examination, the foreign object was palpated at the tip of the index finger. Chest X-ray revealed intraabdominal free air. Subsequent abdominal-pelvic CT scan demonstrated not only foreign body retained in the rectum but also perforation in the sigmoid colon. The patient underwent laparotomy for exploration under the general anesthesia. The foreign body was removed through the anus by squeezing the rectum intra-abdominally. For the perforated sigmoid colon, primary repair was performed. Case 4. A 59-year-old male came to the ER, complaining perianal pain with edema for a week. On digital rectal examination, sharp, needle-like foreign body was palpated in the rectum. On the abdominal-pelvic CT scan, 3cm sized linear object retained in the rectum was shown. On sigmoidoscopy, it was evident that the foreign body was fish bone, and it was successfully removed by using endoscopic forceps.

**Conclusions/Discussion:** The management of retained foreign body requires sophisticated approach based on accurate information and thorough evaluation. The size, shape, and nature of the foreign object should be known before any attempt to remove. Appropriate method in various interventions should be chosen to least the injury to the rectum and anus.

#### ADENOCARCINOMA OF THE SIGMOID COLON MIMICKING AN ABDOMINAL WALL ABSCESS: A CASE REPORT.

P473

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G. Velimezis, I. Karanikas  
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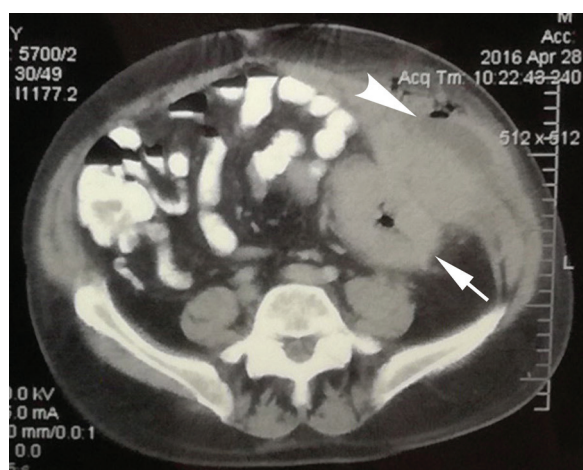
**Purpose/Background:** The purpose of this case study is to report an uncommon clinical manifestation of an adenocarcinoma of the sigmoid colon, such as rupture of the tumor into the abdominal wall, mimicking a large abdominal wall abscess located in the left lower quadrant of the abdomen.

**Methods/Interventions:** A 68 years old male presented to the emergency department with left lower quadrant pain, fever and tachycardia. Clinical examination revealed an inflamed, palpable, painful mass. The patient had never undergone preventive colonoscopy. Blood tests showed significant elevation of white blood cells and CRP. The U/S showed high echogenic collection subcutaneously. CT scan revealed rupture of the sigmoid colon into the abdominal wall. Emergency laparotomy was performed. Findings included a solid mass of the sigmoid colon ruptured into the soft tissue forming a large abscess through the abdominal wall along with fecal material. Hartman's

procedure was performed. The abscess of the abdominal wall was drained and a drainage tube was inserted through the cavity into the left paracolic gutter. A second drainage tube was placed in Douglas pouch.

**Results/Outcome(s):** The patient had a surgical wound infection on the midline incision. He had pus drained through the paracolic tube until three days prior to his discharge. He resumed soft diet the 3rd post-operative day and he was discharged asymptomatic after a total of 14 days. The histological report revealed a ruptured adenocarcinoma of the sigmoid colon excised in clear margins. There was a total of 21 (twenty one) lymph nodes harvested with none of them positive for malignancy.

**Conclusions/Discussion:** Adenocarcinoma of the colon rupture to the abdominal wall and presenting as an abscess is extremely rare. Despite the rarity of this complication, surgeons in the ER should be aware of the likelihood that a stage 4 adenocarcinoma of the colon could potentially rupture into the abdominal wall, thus mimicking a soft tissue abscess. In cases where colon cancer's only symptom is a soft tissue inflammation, further screening and investigation is required before the surgeon decides for the therapeutic approach.



Computed Tomography revealing a sigmoid mass which ruptures through the abdominal wall.

## PNEUMATOSIS INTESTINALIS IN LUNG TRANSPLANT RECIPIENTS: A CASE SERIES.

P474

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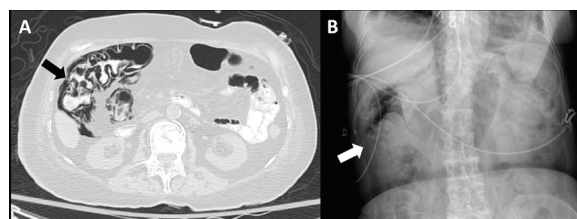
**Purpose/Background:** To report our experience with the diagnostic work-up of pneumatosis intestinalis (PI) in lung transplant recipients along with their management strategies.

**Methods/Interventions:** We reviewed charts and imaging of patients presenting with PI to the lung transplant service at a high volume lung transplant program over a 6 month period. Data reviewed included imaging,

immunosuppression, gastro-intestinal procedures, clinical presentation and management strategies.

**Results/Outcome(s):** Three double lung transplant recipients (A, B, C) developed PI over a 6month period; the time interval post lung transplant being 3 weeks, 6 months and 17 months respectively. Presenting symptoms were abdominal pain and diarrhea in 2 patients (A and C) where as one patient was completely asymptomatic (B). Immunosuppression in all 3 cases consisted of a calcineurin inhibitor, an anti-metabolite and low dose prednisone. PI was diagnosed based on findings on CT scan (A and B), and abdominal x-ray (C). All patients had benign abdominal exams and non-surgical management strategies were pursued to resolution. Non-operative management strategies including a combination of bowel rest, elemental tube feeds or liquid diet, short course broad spectrum antibiotics, and serial abdominal imaging with abdominal x-rays was pursued.

**Conclusions/Discussion:** PI has been well described in bone marrow transplant recipients but is less commonly seen after solid organ transplantation. Several theories exist to explain the pathogenesis of PI. The three leading thoughts include mechanical, bacterial, and immunosuppressive mechanisms to explain the formation of gas pockets in the bowel wall. Historically, PI has been managed with exploratory surgery due to concerns for a life-threatening intra-abdominal processes including bowel perforation and ischemia. While this concern remains justified in lung transplant recipients, our experience has shown that PI is frequently a benign process and successfully managed with non-operative treatment. Our institution is a high volume lung transplant program and a multidisciplinary model of management of PI has resulted in successful conservative management. Presently, there is no clear consensus regarding the non-operative management of this clinical finding; and treatment strategies include prolonged bowel rest with hyper-alimentation in addition to long course antibiotic therapy. We propose a conservative yet vigilant management strategy for this unique patient population that incorporates serial abdominal examination, plain imaging, elemental tube feeds, and minimal use of broad spectrum antibiotics. It is important to note that solid organ transplant recipients may be at higher risk of surgical complications due to ongoing chronic immunosuppression. While these observations are limited due to the low incidence of PI, a larger prospective study would certainly help bring more clarity to the data.



**Figure 1:** Pneumatosis intestinalis seen on CT abdomen of patient A (A – black arrow) and on abdominal x-ray of patient C (B – white arrow).

### RISK FACTORS FOR COMPLICATIONS AFTER DIVERTING ILEOSTOMY CLOSURE IN PATIENTS WHO UNDERWENT SURGERY FOR RECTAL CANCER.

P475

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**Purpose/Background:** To clarify risk factors for complications occurring after diverting ileostomy closure in patients who underwent surgery for rectal cancer.

**Methods/Interventions:** The study group comprised 240 patients who underwent a diverting ileostomy at the time of lower anterior resection or internal anal sphincter resection in our department from 2004 through 2015. Univariate and multivariate analyses were performed to examine whether the following 14 variables are risk factors for postoperative complications.

**Results/Outcome(s):** Univariate analysis showed that an age of 72 years or older ( $p = 0.0017$ ), a time to surgery of 6 months or longer ( $p = 0.0016$ ), and an operation time of 145 minutes or longer ( $p = 0.0228$ ) were significant risk factors for postoperative complications. Multivariate analysis showed that age (odds ratio, 3.3108;  $p = 0.0033$ ), the time to surgery (odds ratio, 3.6637;  $p = 0.0026$ ), and operation time (odds, 2.8344;  $p = 0.0113$ ) were independent risk factors.

**Conclusions/Discussion:** The most common complications were intestinal obstruction and wound infection. Age, time to surgery, and operation time were independent risk factors for postoperative complications. Temporary ileostomy closure should be performed within 6 months after surgery for rectal cancer.

### HIGH GRADE SQUAMOUS INTRAEPITHELIAL LESIONS IN THE PROXIMAL RECTUM OF THREE PATIENTS TREATED FOR ULCERATIVE COLITIS WITH IMMUNOMODULATORS.

P476

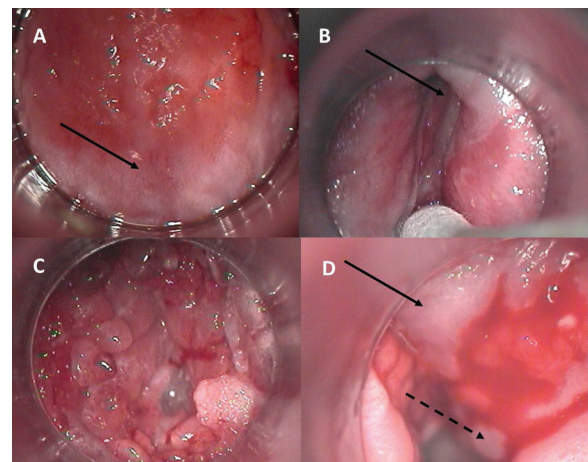
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*New York, NY*

**Purpose/Background:** Anal canal high grade squamous intraepithelial lesion (HSIL) is the precursor to anal cancer. Immunocompromised patients are at increased risk of HSIL which is usually found within 3cm of the anal verge. High resolution anoscopy (HRA) with an 8cm anoscope is used to identify and guide cautery treatment of HSIL. We report three patients with a long-term history of ulcerative colitis (UC) treated with systemic immunomodulators who developed proximally located rectal HSIL.

**Methods/Interventions:** A case study of three patients treated at a surgical practice specializing in the diagnosis and treatment of HPV-related anorectal disease.

**Results/Outcome(s):** Three patients with active UC, treated with either 6-mercaptopurine or systemic corticosteroids during their disease course, were screened for anal HSIL. The patients were two HIV-negative women, 63 and 48-years-old, and a 51-year-old HIV-positive man. All patients had underlying UC for 10, 16 and three years, respectively. They each presented with HPV-positive HSIL visibly extending above the limits of the 8cm anoscope used in HRA. Subsequent colonoscopy biopsies revealed HSIL extending proximally to 10cm in two patients and 22cm in the third. Electrocautery treated distal HSIL and argon plasma coagulation (APC) delivered via colonoscopy treated proximal HSIL. Over a mean of three years follow-up, all patients had multiple HSIL recurrences in the anal canal and rectum ablated with electrocautery and APC. While all had HSIL at their most recent visit, the disease was limited to the anal canal and distal rectum. Asymptomatic strictures developed in all three patients at 3cm, 10cm, and 23cm respectively. None developed cancer. All had episodes of active UC. Some HSIL lesions extended as "tongues" of contiguous dysplasia from the distal anus to proximal rectum while other areas formed HSIL islands separated by non-dysplastic, rectal mucosa. All three of these patients continue to be monitored at the clinic for evidence of recurrence.

**Conclusions/Discussion:** It is unclear what causative role systemic immunomodulators play in predisposing UC patients to proximal HSIL. These HSIL lesions probably developed on an extension of HPV infected squamous epithelium growing proximally over inflamed rectum. Islands developed when areas of squamous epithelium degenerated creating non-contiguous areas. This study highlights the potential for HSIL to extend into the rectum either as a contiguous patch or isolated islands and the need for heightened surveillance in patients with extensive anal canal HSIL treated with immunodulator therapy. HSIL identified at the limit of the anoscope should be investigated further with colonoscopy and APC ablation can serve as an effective treatment option. Patients are at risk for stricture but it is unclear what role the UC or the ablation played in stricture formation.



## ANORECTAL FISTULA BY MYCOBACTERIAL TUBERCULOSIS: CASE REPORT AND RETROSPECTIVE ANALYSIS IN SINGLE HOSPITAL.

P477

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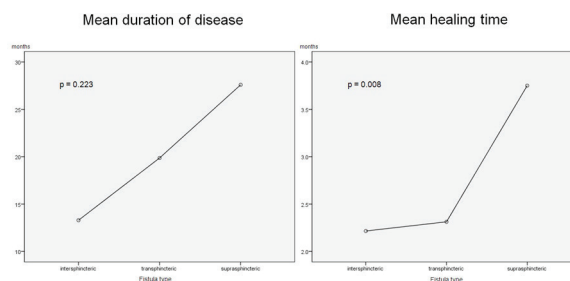
**Purpose/Background:** Prevalence rate of the tuberculosis (TB) in Korea (80.2 per 100,000 in 2015) was higher than those of Western countries. But Anorectal TB is still accounts for only an extremely small proportion (<1%) of all cases in Korea. Sometimes it is difficult to diagnose anorectal TB. Because clinical and pathologic manifestations of anorectal TB is similar to Crohn disease, hidradenitis and actinomycosis. Treatment result of TB fistula is good, but healing time of TB fistula may take longer time if correct diagnosis is not performed.

**Methods/Interventions:** none

**Results/Outcome(s): Case report** A 75-year-old man was admitted our hospital with anal pain and fever for 2 weeks. In operative finding, the U-shaped supralevator abscess was founded from 2 to 10 o'clock and internal opening was not identified. The pathology was chronic inflammation without granulation. After 4 weeks, wound was not healed, internal opening of fistula was detected and the feces were drained through the external opening. Repeated biopsy was done but only acanthosis with inflamed granulation tissue was noted. After additional 4 weeks the wound was worsened, so he underwent debridement and seton procedure to identify the pathology. The final pathology was consistent with TB. The patient took anti-TB medication for 9 months. Finally the wound was closed without additional operation. Total healing time was 13.7 months. **Results** Among 14846 patients who had anorectal fistula 2003 to 2015, patients with anorectal TB were 113. Among them, the data of 87 patients was analyzed. The mean patient age was 41 years (range 18-75 years). Males were predominant (88.5%). The most common type of fistula was Intersphincteric type (n=38) and transsphincteric type (n=31), suprasphincteric type (n=18) in consecutive order. 53 patients underwent fistulotomy, 16 patients did seton apply, 15 patients did Hanley's operation and 3 patients did flap operation. Most patients took anti-TB medication for 6 months. The mean wound healing time was 2.5 months. The rate of re-operation for delayed healing was 12.6%. Disease duration of suprasphincteric TB fistula is longer than intersphincteric and transsphincteric fistula, but p value was no significant (p value = 0.261). There was statistically significance between wound healing time and fistula type (p value = 0.008).

**Conclusions/Discussion:** Anorectal TB fistula is a rare extrapulmonary type of the disease. The average wound

healing time was within 3 months if they took anti-TB medication. But confirmative diagnosis of anorectal TB was occasionally difficult in our case. Duration of disease was not significantly influenced to the type of fistula or severity. Longer duration of treatment was needed when the fistula type is more extended. Anorectal TB should be considered for the differential diagnosis of recurrent and complicated fistula.



## BLIND LOOP SYNDROME IN A PATIENT WITH A HISTORY OF ILEAL POUCH-ANAL ANASTOMOSIS AND SMALL BOWEL ANASTOMOSES.

P478

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**Purpose/Background:** With the availability and ease of use of linear staplers, side-to-side intestinal anastomoses are more commonly performed than end-to-end anastomoses. Rarely, side-to-side anastomoses can be complicated by progressive dilation, stasis of enteric contents, bacterial overgrowth and inflammatory changes of the bowel wall. This so-called "blind loop syndrome" can manifest clinically as bleeding secondary to ulceration, anemia, and obstructive symptoms. We report a case involving a 43-year-old woman with a history of ileal pouch anal anastomosis (IPAA) for ulcerative colitis. At the time of IPAA surgery 18 years ago, she had a diverting loop ileostomy which was subsequently reversed with a stapled anastomosis. Eight years ago, she presented with a closed loop bowel obstruction for which she underwent bowel resection and a side-to-side stapled anastomosis distal to her previous ileostomy reversal anastomosis. Subsequently, she had been well until the past 12 months, during which she has had recurrent hematochezia, nausea, and left-sided abdominal pain. Pouchoscopies did not reveal any pathology in the pre-pouch ileum, pouch, or anal transition zone. Magnetic resonance enterography did not suggest any abnormality. She ultimately underwent a computerized tomography (CT) scan of the abdomen and pelvis that revealed focal dilation of the bowel at her two previous small bowel anastomoses which appeared to be adjacent to each other. Blind loop syndrome was suspected, and surgical intervention was carried out.

**Methods/Interventions:** At laparotomy, the two stapled small bowel anastomoses were identified in the left abdomen. These two anastomoses were indistinguishable from each other and formed essentially one markedly dilated bowel segment that included a large blind outpouching at the segment's superior aspect. This segment's bowel wall was edematous but viable with no perforation. Examination of the rest of her bowel including the ileal pouch revealed no other abnormality. The dilated segment including the two previous anastomoses was resected, and a new anastomosis was constructed in side-to-side fashion as it was sufficiently distant from her ileal pouch.

**Results/Outcome(s):** Postoperatively, she recovered without complication. Histopathology of the resected bowel segment revealed edematous bowel wall with prominent inflammatory changes of the mucosa. At most recent follow-up over 12 months after surgery, she has continued to be well with no recurrent symptoms.

**Conclusions/Discussion:** Blind loop syndrome should be part of the differential diagnosis in the setting of supportive radiographic findings. In this case, the close proximity of two stapled side-to-side anastomoses likely predisposed to progressive focal bowel dilation and stasis of enteric contents. An end-to-end anastomotic configuration may be a more prudent choice when constructed adjacent to an existing side-to-side anastomosis.

### CECAL INTRAMURAL HEMATOMA PRESENTING AS SYNCHRONOUS COLONIC MASS.

P479

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MUSCATINE, IA

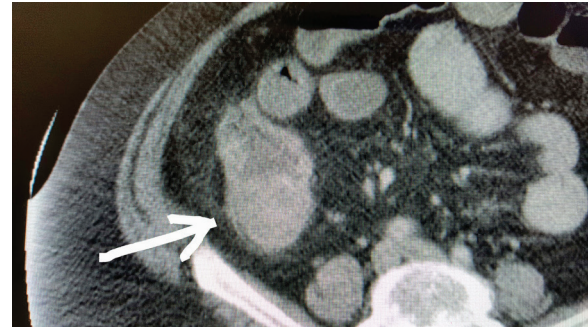
**Purpose/Background:** Intramural hematoma of colon is rare phenomenon. It is one of the important differential diagnoses which should be considered in planning the management of colon tumors.

**Methods/Interventions:** The author reports case study of cecal intramural hematoma presenting as synchronous tumor in a 41 years old male who was admitted with acute colonic obstruction due to sigmoid colon mass/stricture. Emergency preoperative workup failed to reveal true nature of mass. Management of colon obstruction with partial colon resection eventually confirmed the diagnosis.

**Results/Outcome(s):** Inability to diagnose intramural hematoma in cecum culminated in unnecessary right hemicolectomy where it was confused with synchronous malignancy.

**Conclusions/Discussion:** Intramural hematoma of colon may create a diagnostic dilemma in management of colon masses. Attention to history of abdominal trauma and colon procedures such as colonoscopy is important. Preoperative endoscopy may help in differentiating

hematoma from true colon malignancy as most of colon tumors are mucosal in origin. Emergency situations still risk the patients with colon resection for this benign condition as cross sectional imaging may fail to differentiate intramural hematoma from true mass.



### SAFETY OF TRANSRECTAL AND TRANSVAGINAL DRAINAGE OF PELVIC ABSCESES: OUTCOMES FROM A SINGLE INSTITUTION.

P480

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**Purpose/Background:** The literature on the safety and long-term sequelae of transrectal and transvaginal drainage of the pelvic abscess by interventional radiologists are limited. We evaluated the outcomes and safety of these procedures at our institution.

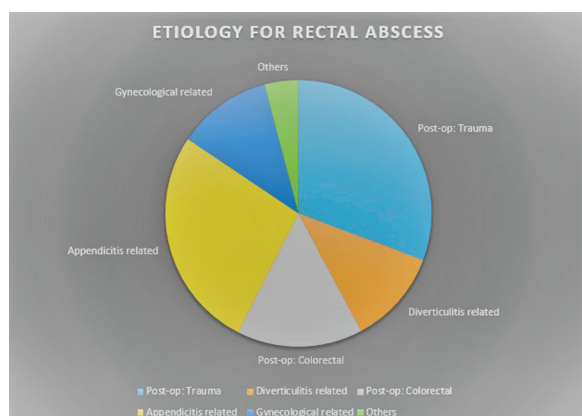
**Methods/Interventions:** A retrospective review was done of all patients at our institution from 2005-2016 who underwent drainage of a pelvic abscess by either transrectal or transvaginal approach. This included radiologic guidance by computed tomography, endorectal ultrasound, and fluoroscopy. Outcomes examined included the need for surgical intervention, the length of stay and evidence of fistula.

**Results/Outcome(s):** The study included 26 patients and their ages ranged from 24 to 88 with a nearly equal distribution of gender (53.8% men). 46.1% patients were African-Americans and 26.9% were Caucasians. Body mass index ranged from 15.6 to 41.9 (Mean 28.39, Median 30.8). Postoperative pelvic abscess formation after penetrating injury to the abdomen was the etiology for abscess formation in 27% patients, 23% were after appendectomies, 11.5% each was from diverticular disease related, and gynecological causes. Another 11.5% patients had abscesses as a result of an anastomotic leak from a low rectal anastomosis. Pelvic abscess diameter ranged from 3.3 to 10.0 cms (Mean 6.3, Median 5.9). Inability to drain the pelvic abscess by percutaneous route necessitated transrectal or transvaginal drainage in most patients. All the procedures were performed by transrectal route except one



patient who had a transvaginal drainage. 92.3% drainage procedures were performed with transrectal ultrasound probe guidance and 75% of such drainage also included fluoroscopic guidance. 7.6% of the procedures were done with computed tomography guidance. These procedures were done with conscious sedation except in two patients who had their procedures performed in the operating room under general anesthesia with endorectal ultrasound guidance. Many of these procedures were performed in right or left lateral positions and involved placing a pigtail catheter sized between 8 and 10Fr in size in over 80% of patients. Drains were removed between 2 and 7 days in all patients except for two where the drain fell out. Follow-up period after the procedure ranged from 1 to 107 months (Mean 30.4 months, Median 18) in the study. During the post-procedural follow-up period, only one patient required operative intervention in the same hospital stay. This patient had an anastomotic leak after ileal pouch creation for Ulcerative Colitis and their initial drainage procedure was done in the operating room. None of the patients who had interventional radiology guided drainage needed follow-up procedures.

**Conclusions/Discussion:** Drainage of pelvic abscess, when indicated through transrectal route using radiological guidance, appears to be a safe and effective procedure.



### THE LAID OPEN PERINEAL WOUND MANAGEMENT AFTER PERINEAL EXCISION SURGERY.

P481

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**Purpose/Background:** Deep pelvic surgical site infection occasionally occurs for patients undergoing perineal excision surgery such as abdominoperineal excision and pelvic exenteration because of large pelvic dead space. It could cause pelvic sepsis and result in longer hospital stay. The procedure to prevent infection, especially for patients having contaminated surgery, is warranted.

**Methods/Interventions:** Nine patients underwent perineal excision surgery followed by the laid open management for the perineal wound to prevent deep pelvic infection were identified. Morbidity and feasibility for this method were assessed.

**Results/Outcome(s):** Five patients had inflammatory bowel disease and four patients had rectal malignancy. Abdominoperineal excision was performed in three patients, subtotal proctocolectomy in one patient, total proctocolectomy in four patients and total pelvic exenteration in one patient. The patient undergoing total pelvic exenteration had the upper one third wound closed and had the remaining left open. The reason for adopting laid open method was intraoperative contamination in four patients and preoperative perianal infection by anal fistula in five patients. Postoperatively, bowel obstruction developed for two patients, peristomal abscess for one patient. No patient experienced pelvic sepsis or herniation through the open perineal wound. Additional opening of pelvic wound was made for better drainage in two patients. One patient has not had his wound closed because of hypoalimentation for severe Crohn's disease. Besides the one patient, mean time to no need of a perineal pad was 78days (34-126) and mean time until epithelization of the wound was 114days (78-167).

**Conclusions/Discussion:** The laid open management for the perineal wound after perineal excision surgery was safe and feasible for prevention of deep pelvic surgical site infection in patients undergoing contaminated pelvic surgery. There is possibility that this procedure is not fit for patients with hypoalimentation because of malgranulation. Further evaluation is needed for identifying unfit patients for this procedure.

### ANTERIOR RESECTION WITH A DEFUNCTIONING ILEOSTOMY SHOULD BE CONSIDERED INSTEAD OF A HARTMANN'S PROCEDURE FOLLOWING AN EMERGENCY SIGMOID COLECTOMY.

P482

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**Purpose/Background:** Options to restore gastrointestinal continuity following an emergency sigmoid resection include an end colostomy, a primary anastomosis with or without a defunctioning ileostomy. The worries of a clinical colo-rectal anastomotic leak often results in either an end colostomy (Hartmann's procedure, HP), or an ileostomy being created. Many patients are still keen to have their stomas reversed after they recover from the emergency operation. Our study aims to evaluate the stoma closure rates between emergency HP and Anterior Resection (AR) with a diverting ileostomy.

**Methods/Interventions:** A retrospective review of all patients who underwent emergency sigmoid colectomy with either an end colostomy or diverting ileostomy from May 2011 to May 2013 was conducted. Data collected included patient demographics, peri-operative parameters and investigation results for both the index emergent operation and that of their stoma reversal. The reasons for non-reversal were also documented.

**Results/Outcome(s):** A total of 36 patients (HP: n=28, 77.8%. AR: n=8, 22.2%) underwent emergent procedures for colorectal pathologies during the recruitment period. Both groups were similar for gender distribution, median age, Body Mass Index (BMI), serum albumin and comorbidities. AR tend to have a longer median index operative time (242 vs 194 minutes,  $p=0.223$ ) and have a higher rate of stoma reversal (62.5% vs 17.9%,  $p=0.024$ ). Patients' poor pre-morbid conditions and nursing related issues were the main reasons for non-reversal in HP (39.1%) while local and distant recurrence was the main reason for non-reversal for AR (66.7%). Reversal times for HP was also significantly longer than that of AR (177 vs 74.5 minutes,  $p=0.034$ ).

**Conclusions/Discussion:** The rate of stoma reversal following an emergency sigmoid colectomy is low. Whilst the index Hartmann's procedure is marginally faster, the majority of these patients never had their stomas closed. The operation for their closures is also technically more challenging than for a diverting ileostomy.

#### SPLenic FLEXURE TAKING DOWN IS NOT ALWAYS NECESSARY FOR LAPAROSCOPIC SPHINCTER PRESERVING SURGERY OF THE LOW RECTAL CANCER.

P483

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**Purpose/Background:** The division of Inferior Mesenteric Artery (IMA) and Inferior Mesenteric Vein (IMV) at the root of them and splenic flexure taking down are considered as a standard technique of the sphincter preserving surgery for low rectal cancer. However, it has not always been necessary in most of our patients. It may depend on the length of sigmoid colon in Japanese. We examined the division site of IMA and IMV for the sphincter preserving surgery of low rectal cancer in our hospital.

**Methods/Interventions:** From October 2013 to November 2016, thirty-seven cases underwent laparoscopic sphincter-preserving surgery for low rectal cancer whose tumor was located within 5cm from anal verge. We examined the division site of IMA (left colic artery preservation or not) and IMV (branch of IMV preservation or not). We also examined the cases whose splenic flexure

taking down was required and short-term outcomes of the operation.

**Results/Outcome(s):** Median (range) Age was 66 yo. (44-83). Male to Female ratio was 26:11. Median BMI was 22.1 kg/m<sup>2</sup> (17.5-29.1). Median tumor distance from anal verge was 4cm(1-5) and maximum tumor size 30mm(7-60). Clinical T of TNM classification were (T1:7,T2:11,T3:17,T4a:2). ASA-PS of the patients were(0:1,1:16,2:18,3:2). 10 cases underwent preoperative radio (chemo) therapy and 7 cases underwent lateral lymph-node dissection (bilateral:5, unilateral:2). Operative procedures were Low anterior resection (LAR) with DST reconstruction:23, Inter-sphincteric resection (ISR):14. Duration of operation and blood loss of each procedure were LAR:366min(191-483) and 51ml(3-534), ISR:424min(283-573) and 51,158ml(50-685). In all but 3 cases (LAR:2, ISR:1), left colic artery could be preserved (91.9%) and IMV was divided at the caudal side of Left colic vein. In these 3 cases, IMV was divided at cranial side of the left colic vein. Only two cases (5.4%) required splenic flexure taking down. In 19 cases, diverting stoma (DS) was created. Proximal and distal length from the tumor margin was 142.5 mm (85-295) and 15mm(5-40). Harvested number of lymph-nodes were 11(4-35). Four cases without DS encountered anastomotic leakage and 3 cases of them required 2<sup>nd</sup> operation for peritoneal ravage and DS creation. There was no other postoperative morbidity of Clavien-Dindo Grade3-5 besides anastomotic leakage. After 18 (0-36) postoperative months, 36 cases have not experienced recurrence of the tumor. One case experienced liver and lateral lymph-node metastasis.

**Conclusions/Discussion:** In our series, sphincter preserving surgery can be performed preserving left colic artery and some branch of IMV without splenic flexure taking down in most of the cases.

#### PERINEAL HERNIAS AFTER ABDOMINOPERINEAL EXCISION: A SINGLE SURGEON SERIES WITH A SIMPLE SOLUTION.

P484

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**Purpose/Background:** Extralevator abdominoperineal excision for rectal cancer is associated with increased incidence of perineal hernia. Conservative treatment consist of perineal support garments. Surgical repair can be undertaken by an abdominal, laparoscopic or perineal approach. The use of a composite or biologic mesh is considered more effective than a simple suture as the latter is often not feasible after excision of the levator plate at the time of rectal resection. The purpose of this study was to assess outcomes of perineal hernia repair using a composite mesh through a perineal approach.

**Methods/Interventions:** During the study period, 6 patients underwent 7 perineal repairs using a composite Parietex mesh through a perineal approach with the patient in prone position. A bridging repair was undertaken using non-absorbable sutures to fix the mesh. 5/6 patients had previously had a laparoscopic extralevator excision for rectal cancer and 1/6 conventional open abdominoperineal excision. Patient characteristics, outcome were entered into a database prospectively and analysis of these 6 patients was performed.

**Results/Outcome(s):** Median age was 76 years (range 66 to 79 years old), 3 females and 3 males. Analysis revealed a median time interval of 17.2 months between APE and surgical repair of perineal hernia (range from 1.6 to 28.7 months). One patient had a small bowel resection at the time of repair. There were no other complications associated with the technique. The recurrence rate was 1/6 (17%) which was successfully repaired. Median time for operation was 84.5 minutes (range from 30 to 98 minutes). Median length of stay was 3.5 days (range from 2 to 8 days).

**Conclusions/Discussion:** A perineal approach using a bridging repair technique with a composite mesh appears to be an effective and simple solution for the treatment of perineal hernias after abdominoperineal excision for rectal cancer.

#### IS TATME TECHNIQUE SAFE AND EFFECTIVE IN COMORBID PATIENTS AND IN THE ELDERLY? A RETROSPECTIVE STUDY OF 30 CONSECUTIVES CASES.

P485

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**Purpose/Background:** Rectal Cancer represents a challenge for colorectal surgeons and is recognised at the moment as the second leading cause of death worldwide. Recent surgical developments have improved anastomosis integrity and mesorectal excision techniques. These, combined with new neoadjuvant chemoradiation strategies are instrumental in enhancing longevity and quality of life. Better population health has dramatically increased life expectancy in recent decades. There is now an older population with a greater number of medical comorbidities falling victim to rectal cancer. Italy and Japan have exceptionally high percentages of elderly patients (> 75 years). Specifically, in Liguria, in north west Italy, there is an high incidence of rectal cancer diagnosed in people over the age of 75. The aim of this study is to show feasibility and safety of laparoscopic taTME in elderly patients by retrospectively analysing 30 consecutive patients who underwent taTME stratified by age. An age of 75 years at time of surgery will be used to divide elderly from non-elderly

patients. Statistical analysis will then be performed to compare the groups against selected outcomes.

**Methods/Interventions:** From April 2014 to May 2016, a consecutive series of 30 patients underwent laparoscopic taTME. 29 patients had a preoperative diagnosis of rectal cancer. A further young patient carried a diagnosis of FAP syndrome with right colon neoplasia and rectal polyps, ultimately undergoing proctocolectomy with ileo-rectal anastomosis. Median age was 71 and 24 patients (80%) were male. Five patients were admitted emergently for obstruction or rectal bleeding (16.64%). The mean distance of the rectal cancer from the anal verge was 6.5 cm (range 2 to 12cm). ASA score III-IV in 10 patients.

**Results/Outcome(s):** Mean operative time was 280 minutes. 22 patients underwent primary colo-rectal anastomosis, while 8 patients with profound comorbidities received end colostomy. In 8 patients we performed laparoscopic taTME with double team approach. Length of Stay (LoS) was 9.8 days. Overall mortality rate was 6.6%. In-hospital mortality in elective admissions was 4.2%. Complete mesorectum excision and tumor free margins was achieved in all patients. Mean lymph nodes harvested 9.8. Student's T and Chi squared analysis showed no difference between the two groups in operative time, LoS, post-operative complications and mortality.

**Conclusions/Discussion:** TaTME is a new technique providing a good visualisation of the pelvis in a "down to up" fashion, allowing better dissection of the mesorectum. It remains unclear if this technique is superior in oncological outcome and functional outcome compared with the standard laparoscopic procedure. This study, although small in number, indicates taTME is technically feasible in elderly patients with comparable outcome to younger patients. Advanced age and medical comorbid status should not preclude taTME.

#### RHABDOMYOLYSIS IN COLORECTAL SURGERY: THE HIDDEN KILLER?

P486

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**Purpose/Background:** Complications in colorectal surgery have been well described in literature and include anastomotic leaks, wound complications, damage to other organs such as ureter, anaesthetic complications etc. Rhabdomyolysis (RM) is a rare but potentially fatal clinical syndrome most commonly seen following crush injuries, excessive muscle activity, extremes of temperature and alcohol abuse. It has been described after prolonged surgery, especially in patients undergoing bariatric surgery for morbid obesity and with extreme intraoperative positioning in patients undergoing urological surgery, but its true risk in major colorectal surgery is yet to be appreciated.

**Methods/Interventions:** We present the case of RM in a fit 43 year old ex-soldier who underwent ileo-anal pouch excision – this was a prolonged open abdominopelvic operation in lithotomy position, with a sandbag placed at his lumbosacral junction to further improve perineal exposure; total anaesthetic time was 482 minutes.

**Results/Outcome(s):** Post-operatively, he complained of severe right calf pain in the recovery room. On investigation, he was found to have a serum creatine kinase of 20,751 U/l; myoglobinuria was also noted later. Following confirmation of RM, vigorous treatment was instituted, with promotion of diuresis with aggressive intravascular fluid supplementation, correction of electrolyte disturbances, close monitoring for limb swelling, urinary output and clotting disorders. His renal function remained normal and he made an uneventful recovery.

**Conclusions/Discussion:** Rhabdomyolysis should be considered in all patients undergoing major colorectal surgery where surgery is likely to be protracted and exaggerated lithotomy patient positioning may be required, especially with added risk factors such as obesity and prolonged muscle compression. Left untreated, RM can result in myoglobinuric kidney injury, metabolic acidosis and coagulopathies. Intraoperative repositioning in prolonged procedures is important; aggressive treatment once a diagnosis of RM has been made is imperative to prevent potentially devastating outcomes.

#### 'FILLING THE VOID TO MESH OR NOT TO MESH' : ASSESSMENT OF THE ROLE OF STRATTICE™ MESH RECONSTRUCTION OF THE PELVIS AFTER PELVIC EXENTERATION SURGERY.

P487

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**Purpose/Background:** Surgery for locally advanced and recurrent pelvic malignancy remains challenging for both the patient and the treating team of surgeons. Surgery specific complications such as deep perineal flap wound dehiscence / perineal flap complications, mechanical small bowel obstruction (especially in the context of exposed of sacrectomy and pubic bone) and perineal enterocutaneous fistula are reported in the literature to affect 20, 5 and 4 percent of patients respectively. A variety of surgical techniques are described to prevent these complications. The placement of biological mesh to the pelvis has been described in the context of abdominoperineal resection. To date this technique has not been described in those patient that undergo pelvic exenteration surgery. This study aims to assess the role of Strattice™ mesh reconstruction of the pelvis after Pelvic Exenteration surgery. We aim to assess

the clinical effectiveness of this reconstructive technique in the prevention of procedure specific complication.

**Methods/Interventions:** We analysed data from a prospectively maintained database of patients who underwent Strattice™ mesh (see Figure 1.) reconstruction of the pelvic inlet and pelvis after pelvic exenteration surgery or surgery for locally advanced rectal cancer. Strattice mesh was secured at the pelvic inlet or within the true pelvis to help prevent small bowel descent into the pelvic void. Pelvic drains were placed above and below the mesh to prevent pelvic collection.

**Results/Outcome(s):** We identified 10 patients who underwent Strattice™ mesh reconstruction of the pelvis. Nine of whom had their surgery in the context of Pelvic Exenteration for locally advanced rectal cancer a pre-sacral tumour. Two patients had repair of a perineal hernia in the context of previous surgery for locally advanced rectal cancer. Six patients were male. The median age was 65 (59 - 68) years. 9 of the patients had received prior chemoradiotherapy. The median time to follow up was 6 (5 - 8) months.

**Conclusions/Discussion:** We conclude that reconstruction of the pelvic inlet with Strattice™ mesh in the context of pelvic exenteration surgery is a safe and feasible technique in the reconstruction of the pelvic inlet and aids in the prevention of surgery specific complication.

#### OUTCOMES OF ROBOTIC ILEOCOLIC RESECTION FOR CROHN'S DISEASE COMPARED TO LAPAROSCOPIC .

P488

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**Purpose/Background:** The robotic platform has seen a steady increase in colon and rectal surgery, including patients with Crohn's Disease. Laparoscopic (lap) resection is an established approach in the surgical management of Crohn's enteritis (CE). We compared matched cohorts of patients who underwent lap and robotic ileocolic resection for CE, and tested our hypothesis that it is safe and feasible, with low conversion and complication rates.

**Methods/Interventions:** We queried our prospective database of patients with CE who underwent ileocolic resection (ICR) from December 2014-October 2016. We identified and compared a matched cohort of patients 18 years and older with CE who underwent robotic or lap ICR. Patients undergoing open surgery or other resections were excluded. The vessel sealer was used to divide the mesentery in robotic cases, and Ligasure™ (Covidien) in lap cases. In the robotic group, the anastomosis was performed intracorporeal; side-side robotically stapled with hand-sewn 2 layer common enterotomy. In the lap group, the anastomosis was performed extracorporeal; end-side or side-side construction.

**Results/Outcome(s):** We identified 8 patients with CE who underwent robotic ICR (5 females, median age 30 years) and matched them with 14 patients who underwent lap ICR (6 females, median age 33 years). They were well matched for gender, BMI, demographic and other variables such as rate of previous operation (3 robotic, 6 laparoscopic), comorbidities, and preoperative medications. One patient in the robotic cohort and 2 in the lap group had diverting loop ileostomy created. There were no mortalities. There were no intraoperative complications in either group and EBL was similar. The conversion rate was higher in the lap group (7% vs. 0%). Overall morbidity (lap 21% vs robotic 25%), and reoperation rates (lap 7% vs robotic 12.5%) were similar (Table 1). There was one anastomotic leak in the lap group (7%) and one major complications in each group. In contrast, mean time to return of bowel function (robotic 2 vs. lap 6.5 days), and length of stay (LOS) (robotic 3.6 vs. lap 8.5 days) were both lower in the robotic group. With a median follow-up of 6 months, long-term complications were similar and negligible.

**Conclusions/Discussion:** Robotic ileocolic resection in CE is as safe as laparoscopic with minimal morbidity and no postoperative leaks. With comparable EBL, intraoperative and postoperative complications, the robotic instruments were used safely and effectively on challenging mesentery, phlegmon, and chronically obstructed bowel. In addition, each patient had a successful intracorporeal anastomosis and extraction via Pfannenstiel incision resulting in minimal pain, early ambulation, and early return of bowel function, with shorter length of stay, and thus potentially decreased hospital cost. Further prospective studies will be

needed with larger numbers to examine the cost benefit in this patient population.

#### ULCERATIVE COLITIS ASSOCIATED COLORECTAL CANCER IN JAPAN: A RETROSPECTIVE MULTICENTER STUDY.

P489

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**Purpose/Background:** Patients with long-standing ulcerative colitis (UC) are at a high risk of developing colorectal cancer (CRC). Surveillance colonoscopy is recommended to detect CRC, especially in patients with pancolitis and left-sided colitis. If high-grade dysplasia is detected, proctocolectomy is the treatment of choice, partly because patients with UC-associated CRC (UCAC) have a tendency to harbor synchronous multiple CRCs; however, if CRC is confirmed as solitary in patients with quiescent UC, segmental resection with lymph node dissection, which is standard for sporadic CRC, may be sufficient. Therefore, the aim of this study was to clarify the characteristics of UCAC focusing on the incidence and risk factors of synchronous multiple CRCs.

**Methods/Interventions:** Data on patients with UCAC were retrospectively obtained from 10 specialized institutions in the Research Group for Intractable Inflammatory Bowel Disease of the Ministry of Health, Labour and Welfare of Japan. A total of 238 patients with UCAC

**P488 Outcomes of Laparoscopic vs. Robotic Ileocolic Resection for Crohn's Disease**

OUTCOME VARIABLE N (%)	ROBOTIC N=8	LAPAROSCOPIC N=14
Intraoperative Complications	0(0%)	0(0%)
Conversion to Open	0(0%)	1(7%)
Creation of Diverting Loop Ileostomy	1(12.5%)	2(14%)
Mean Return of Bowel Function (days)	2	6.5
Mean LOS (days)	3.6	8.5
Anastomotic Leak/Abscess	0(0%)	1(7%)
Minor Complication	1(12.5%)	3(21%)
	Post operative ileus	C.Difficile infection, Postoperative ileus, Urinary retention
Major complication	1(12.5%)	1(7%)
	Abdominal pain resulting in negative diagnostic laparoscopy	Anastomotic leak
Readmission	2(25%)	2(14%)
	Small bowel obstruction, abdominal pain	Small bowel obstruction, wound infection/anastomotic leak
Reoperation	1(12.5%)	1(7%)
	Negative diagnostic laparoscopy	Enterocutaneous fistula repair

were reviewed in this study. Patients were divided into two groups: the multiple group (patients with synchronous multiple CRCs) and the solitary group (patients with solitary CRC). The risk factors for synchronous multiple CRCs were identified, and receiver operating curves and the area under the curve (AUC) were calculated to predict synchronous multiple CRCs.

**Results/Outcome(s):** Synchronous multiple CRCs were found in the surgical specimens of 37 patients (16%). Eighteen (8%) cases of CRC went preoperatively undetected; however, pathological examination of the surgically resected specimens confirmed CRC. A significantly younger age of UC onset was found in the multiple group compared with the solitary group (45.0 vs. 51.0 years,  $p = 0.016$  and 28.8 vs. 35.3 years,  $p = 0.019$ , respectively). However, AUCs for age of UC onset and at operation were not high enough to predict synchronous multiple CRCs (AUC, 0.62). Gender, family history of CRC, and the presence of primary sclerosing cholangitis did not significantly differ between the two groups.

**Conclusions/Discussion:** A substantial proportion of patients with UCAC harbor synchronous multiple CRCs. In this study, predictors for synchronous multiple CRCs were not identified. Furthermore, CRC lesions were preoperatively missed in 8% of UCAC patients. Thus, restorative proctocolectomy (or proctocolectomy with APR for very low rectal cancer) should be recommended as the standard surgical procedure for UCAC.

#### CASE REPORT: CROHN'S DISEASE AFTER BARIATRIC SURGERY.

P490

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**Purpose/Background:** This case is about a female, 45 yo, no history of diarrhoea, 12 years before that, she was submitted a gastric bypass, no family histories about any colorectal disease, that begun with anal fistulae. Normal colonoscopy. At OR, the first drainage, we realize that fistulae is transsphincteric. and we made some biopsies and at results reveal crohn's disease. Some authors make a relationship between crohns disease and bariatric surgery

**Methods/Interventions:** This study is review of papers about relationship between crohns disease and bariatric surgery, at PubMed.

**Results/Outcome(s):** This studies realize that bariatric surgery could be a begin of crohns disease, at patients with some predisposition. This could be about changes of intestinal microbiota.

**Conclusions/Discussion:** This patient is one of the thousands of patients that has submitted a bariatric surgery, We know about changes of intestinal hormones, but we know a few of the changes of intestinal microbiota. this changes could be a start of new diseases or crohns disease



#### TIME TRENDS AND RISK FACTORS FOR REOPERATION AFTER INITIAL INTESTINAL SURGERY FOR CROHN'S DISEASE IN JAPAN: A RETROSPECTIVE MULTICENTER STUDY.

P491

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**Purpose/Background:** A majority of patients with Crohn's disease require surgical procedures for the treatment of intestinal lesions during their lifetime. Even after the first operation, a recurrence of the disease is not rare and second or even multiple operations are inevitable in many patients. Therefore, the long-term follow-up and the prevention of recurrence are very important factors that need to be addressed. To prevent a recurrence of Crohn's disease, medications such as immunomodulator (IM), an elemental diet (ED), and anti-TNF $\alpha$  antibody drugs (BIO) are prescribed. However, the long-term efficacy of these drugs remains controversial, especially with respect to the reoperation rate. The aim of this study was to examine the time trends and risk factors for patients with Crohn's disease who underwent intestinal surgery.

**Methods/Interventions:** The patient data were retrospectively reviewed from 10 specialized institutions belonging to the Research Group for Intractable Inflammatory Bowel Disease of the Ministry of Health, Labour and Welfare of Japan. A total of 2485 patients

with Crohn's disease were included in this study. The onset of the disease ranged from 1960 to 2015, and they all underwent intestinal surgery. The patient characteristics (sex, age at the onset of Crohn's disease, Montreal Classification and initial intestinal operation year; before 2002/after 2003) and the administered post-operative medications (ED, IM and BIO) were reviewed to evaluate the risk factors for reoperation. The primary outcome was the need of a second intestinal operation (first reoperation). The cumulative reoperation rate was calculated by the Kaplan-Meier method and the findings were compared between the groups using the log-rank test. Univariable and multivariable analyses were performed using the Cox proportional hazard regression model to identify any independent risk factors for the cumulative reoperation rate.

**Results/Outcome(s):** The cumulative reoperation rate after initial intestinal surgery was 24.4 % within 5 years and 48.4 % within 10 years. A multivariable analysis revealed that patients who underwent operation before 2002 showed a significantly higher reoperation rate compared with those who underwent an operation after 2003 (HR 1.359, 95%CI 1.169-1.579,  $p < 0.001$ ). Ileocolic type disease was also a significant risk factor for reoperation (HR 1.557, 95%CI 1.348-1.797,  $p < 0.001$ ). Regarding the post-operative treatment, the post-operative use of IM (HR 0.7446, 95%CI 0.586-0.947,  $p = 0.016$ ) and BIO (HR 0.8368, 95%CI 0.704-0.995,  $p = 0.044$ ) significantly reduced the risk of reoperation.

**Conclusions/Discussion:** The risk factors for reoperation in patients with Crohn's disease were the initial intestinal operation year (before 2002), and the disease location (ileocolic type). The post-operative use of IM and BIO is also considered to prevent reoperation in patients with Crohn's disease.

## SURGERY-FREE SURVIVAL OF KONO-S ANASTOMOSES IN PATIENTS WITH CROHN'S DISEASE.

P492

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**Purpose/Background:** Anastomotic recurrence after bowel resection is a serious problem in patients with Crohn's disease (CD). The Kono-S anastomosis (KSA) is a new technique to resolve this problem. The purpose of this study was to evaluate the efficacy of the KSA for CD.

**Methods/Interventions:** Consecutive patients with CD who were admitted to Hiroshima University Hospital between January 2006 and December 2015 and underwent bowel resections involving the small or large intestine were enrolled. Hand-sewn layer-to-layer anastomoses were performed at that time, but in 2009, the KSA was

introduced in our institution. Patients who underwent a KSA were retrospectively compared with patients who had undergone traditional end-to-end anastomosis (ETEA). KSA was used for all bowel anastomoses except those involving the rectum. In this study, univariate and multivariate analyses were performed to identify risk factors for reoperation on the anastomosis site; the perioperative outcome and surgery-free survival of the anastomoses were estimated.

**Results/Outcome(s):** A total of 225 patients were included: 117 in the KSA group and 108 in the ETEA group. Characteristics and preoperative factors were similar except for mean follow-up (KSA, 37.6 months vs. ETEA, 88.9 months;  $p < 0.001$ ). Of the 51 cases with previous bowel resections, 43% were in the KSA group vs. 53% in the ETEA group. Regarding clinical outcomes, the median operative times, blood loss, and percentage [BR1] of patients requiring blood transfusions were not significantly different between the groups: 217 min, 225 ml, and 10.2%, respectively, for the KSA group vs. 240 min, 250 ml, and 12.2%, respectively, for the ETEA group. Regarding surgical approaches, 27 patients (23%) underwent laparoscopic surgery in the KSA group vs. 5 (5.1%) in the ETEA group ( $p = 0.001$ ). Anastomotic leakage occurred in 6 (5.1%) patients in the KSA group vs. 17 (12.2%) in the ETEA group ( $p = 0.015$ ). Other postoperative complications (superficial surgical site infections [BR2] [SSI], deep SSI, organ space SSI, and intestinal obstruction) were not significantly different between the groups. There were 4 cases (3.4%) of recurrence of surgery in the KSA group and 24 cases (24.4%) in the ETEA group, and the rate of postoperative administration of biological agents was similar (33% and 28.1%, respectively). On multivariate logistic regression analysis, KSA reduced the risk of recurrence of surgery at the anastomosis site (OR 0.15,  $p = 0.001$ ), while anastomotic leakage increased the risk of recurrence (OR 4.15,  $p = 0.01$ ). The Kaplan-Meier analysis showed that the rate of surgery-free survival in the KSA group was 94.4% at 5 years, which was higher than in the ETEA group (83.1%,  $p = 0.009$ ).

**Conclusions/Discussion:** Kono-S anastomosis for bowel resection for CD is associated with a low recurrence of surgery at the anastomotic site, and low anastomotic leakage may be a major factor for the better results.

**ASSOCIATION BETWEEN PROGNOSTIC NUTRITIONAL INDEX AND MORBIDITY/MORTALITY DURING RESTORATIVE PROCTOCOLECTOMY IN PATIENTS WITH ULCERATIVE COLITIS.**

P493

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**Purpose/Background:** Onodera's prognostic nutritional index (O-PNI), determined according to an established formula [ $10 \times \text{serum albumin (g/dL)} + 0.005 \times \text{total lymphocyte count}$ ], is known to be factor for predicting the prognosis of various abdominal intestinal surgical procedures. In this study, we evaluated the association of O-PNI with outcome of a restorative proctocolectomy procedure for ulcerative colitis (UC).

**Methods/Interventions:** This was a single institutional retrospective cohort study conducted by the Department of Inflammatory Bowel Disease, Hyogo College of Medicine, Japan. Pre-operative O-PNI results were examined using ROC analysis to determine cutoff values. Furthermore, pre-operative predicting factors associated with mortality and morbidity were examined using stepwise regression analysis, with morbidity defined as occurrence of a post-operative infectious complication and mortality as death within 30 days after surgery. A pouch-related complication (PRC) was defined as pelvic bleeding or pelvic sepsis, including anastomotic leakage and pelvic abscess occurrence.

**Results/Outcome(s):** We analyzed 1151 patients with UC who underwent a colectomy procedure between January 2000 and December 2015. Mortality and morbidity occurred in 9 (0.8%) and 294 (25.5%) cases, respectively. O-PNI was significantly lower in patients with mortality ( $23.6 \pm 7.0$ ) and those with morbidity ( $36.3 \pm 10$ ) as compared to patients without either ( $p < 0.01$ ). The O-PNI cutoff value for mortality was 32. In multivariate analysis, significant risk factors for mortality were age at surgery  $\geq 56$  years [odds ratio (OR) 26.9], pre-operative CRP  $\geq 5.8$  mg/dl (OR 18.6), and O-PNI  $< 32$  (OR 6.6), while those for morbidity were age at surgery  $\geq 56$  years (OR 1.7), pre-operative CRP  $\geq 5.8$  mg/dl (OR 1.8), and dose of prednisolone  $> 30$  mg/day (OR 1.7). Sub-analysis of 960 pouch surgery cases among this series showed that male gender (OR 1.6), ASA score  $\geq 3$  (OR 2.5), urgent surgery (OR 3.0), and O-PNI  $< 32$  (OR 2.0) were significant risk factors for a PRC.

**Conclusions/Discussion:** Surgery at an older age, elevated CRP, and reduced PNI were found to be predictors of mortality and may be useful indicators for determination of proper surgical timing for patients with poor condition. In addition, for patients with lower O-PNI, the initial surgery should be a total colectomy alone without pelvic manipulation, such as proctocolectomy or pouch reconstruction, to avoid a PRC.

**RISK FACTORS FOR THE DEVELOPMENT OF POSTOPERATIVE ILEUS FOLLOWING ABDOMINAL SURGERY FOR CROHN'S DISEASE.**

P494

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**Purpose/Background:** Postoperative ileus (POI) is a temporary impairment in gastrointestinal motility following surgery, which results in immoderate discomfort, prolonged hospital stay, and increased overall costs. The purpose of this study was to evaluate risk factors in patients who developed POI following abdominal surgery for Crohn's disease.

**Methods/Interventions:** Fifty-six consecutive patients who underwent elective abdominal surgery with bowel resection for Crohn's disease between September 2013 and December 2015 were enrolled in the study. POI was defined as a usage of nasogastric or long tube for symptomatic relief. Patient's demographics, intraoperative factors evaluated by the video, and postoperative factors were reviewed retrospectively and the relationship between these factors and postoperative ileus were assessed.

**Results/Outcome(s):** There were 42 men and 14 women included and median age at the time of surgery was 40.5 (range, 16-68) years. The type of disease was classified into L1 (23.2%) / L2 (16.1%) / L3 (60.7%), and B2 (57.1%) / B3 (42.9%) by Vienna classification. More than one abdominal surgeries had been performed in 39 (69.6%) patients. Twelve patients (21.4%) developed POI, and any colonic lesion of the disease (L2 + L3), damage of bowel with all layers and multiple damage of bowels with sero-muscular layers were detected as independent risk factors ( $p < 0.05$ ) in univariate and multivariate analysis. Preoperative medical management, time of the surgery, blood loss, blood transfusion, use of antiadhesion barrier, and any postoperative factors did not correlate with the occurrence of POI.

**Conclusions/Discussion:** Careful adhesiolysis to avoid damage of bowels is crucial to prevent the development of postoperative ileus following abdominal surgery for Crohn's disease.

**EXPRESSION OF TRPA1 CORRELATING TO THE RECOVERY OF COLONIC TRANSIT FOLLOWING PN DENERVATION IN RATS.**

P495

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**Purpose/Background:** It has been reported that colorectal motility dysfunction due to pelvic nerve (PN) damage is restored over time. However, the adaptive mechanism is unknown. Previous studies implied that



TRPA1 mediated sensory nerve signal input play a crucial role in gut motility control. The current study aimed to observe the colorectal motility restoration in rats following PN transection, and to explore the change of TRPA1 protein expression in this adaptive process.

**Methods/Interventions:** 78 adult rats were divided into two groups randomly: sham and PN cut. Colonic transit function was determined with radioisotope method by calculating the geometric center (GC) of the distribution of  $^{51}\text{Cr}$  at postoperative day (POD) 1, 3 and 7. Expression of TRPA1 in the proximal and distal colon mucosa was detected with Western Blotting at POD1, 3 and 7.

**Results/Outcome(s):** At POD 1, the colonic transit in PN cut group was significantly delayed ( $\text{GC} = 4.91 \pm 0.41$ ,  $p < 0.05$ ), when compared with the sham group ( $\text{GC} = 5.76 \pm 0.85$ ). A significant trend toward recovery was noted in the PN cut group at POD 3 ( $\text{GC} = 5.58 \pm 0.36$ ) and POD 7 ( $\text{GC} = 6.44 \pm 0.78$ ). Western blot demonstrated attenuated expression of TRPA1 in the distal colon mucosa after PN denervation at POD1 ( $0.39 \pm 0.12$ ) compared with that of the shams. A significant trend of increasing expression of TRPA1 was demonstrated in the PN cut group at POD 3 ( $0.78 \pm 0.10$ ) and at POD7 ( $1.06 \pm 0.13$ ).

**Conclusions/Discussion:** Delayed colonic motility due to PN denervation gradually restored overtime, which may relate to the corresponding expression of TRPA1 in the distal colonic mucosa of rats.

#### RECTAL SPARING TYPE OF ULCERATIVE COLITIS PREDICTS UN-RESPONSIBILITY FOR PHARMACOTHERAPIES.

P496

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**Purpose/Background:** Ulcerative colitis (UC) is known as an immune disorder of the colon that generally involves the rectum, but an atypical distribution of inflamed mucosa has previously been noted in certain subtypes, such as the rectal-sparing type (RST). Patients with the rectal-sparing may have a higher risk for disease refractoriness as noted in a previous report, but the clinical significance remains unknown.

**Methods/Interventions:** UC patients who underwent surgery between January 2010 and April 2015 were

included. Patients were classified as having the RST or non-RST based on colectomy specimens or a pre-operative endoscopy. Possible risk factors for urgent/emergent surgery were analyzed. We specifically determined whether the RST is a significant predictor for urgent/emergent surgery.

**Results/Outcome(s):** In total, 46/482 patients were classified as having the RST. The disease severity was significantly worse in patients with the RST ( $p = 0.02$ ). 24/46 patients with the RST required urgent/emergent surgery compared to 107/436 patients with non-RST ( $p < 0.01$ ). The overall incidence of urgent/emergent surgery was 131/482. Duration of disease  $< 70.2$  months [odds ratio (OR) 2.45], severe disease [OR 87.1], total administered steroid dose  $< 5,000$  mg [OR 3.02], pre-operative steroid daily dose  $\geq 9$  mg [OR 2.59], and the RST [OR 5.59] were identified as independent risk factors for urgent/emergent surgery.

**Conclusions/Discussion:** The RST was an independent risk factor for urgent/emergent surgery in the analysis of surgically treated patients with UC.

#### CHARACTERISTICS OF SMALL BOWEL CANCER ASSOCIATED WITH CROHN'S DISEASE.

P497

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**Purpose/Background:** Patients with Crohn's disease (CD) have increased risk of developing small bowel cancer in comparison with the background population. However, little is known concerning to the cancer in detail, because the number of the patients is relatively small. This study aimed to clarify the clinicopathological characteristics between small bowel cancer and colorectal cancer in CD.

**Methods/Interventions:** A literature search was performed with Ichushi (Japanese medical literature database) between 1983 and March, 2015 for small bowel cancer and colorectal cancer associated with CD. Two hundred and 65 cases were picked up, and we excluded 6 cases, because the location of the cancer was not specified clearly. Thus, 265 cases were included in this study. The cases were classified to 2 groups: patients who had small bowel cancer(s) (S group:  $n = 55$ ) and those with only colorectal cancer(s) (C group:  $n = 210$ ), which included perianal fistula cancer.

#### P494 Multivariate analysis of the risk factors for POI

	OR	95% CI	<i>p</i>
Any colonic lesion of the disease (L2 + L3)	NA	NA	0.02
Damage of bowel with all layers	13.96	2.03 - 140.0	0.007
Multiple damage of bowels with sero-muscular layers	9.11	1.44 - 72.17	0.02

Logistic regression analysis

**Results/Outcome(s):** The age at cancer diagnosis was higher in S group (53.5 (29–81); median (range)) than in C group (43 (25–89);  $p < 0.0001$ ). The duration of CD was similar between S group (16 (0–40) years) and C group (15 (0–52) years;  $p = 0.41$ ). The age at CD diagnosis was also higher in S group (39(12–69)) compared with C group (25 (9–84)). S group had more proportion of ileitis than C group (58% vs 10%), whereas 81% of the patients in C group had ileocolitis, and the difference was statistically significant ( $p < 0.0001$ ). In S group, the cancer diagnosis was made before treatment only in 16%, and 70% of these patients had not been diagnosed before pathological examination of the resected specimen. Well differentiated and moderately differentiated adenocarcinoma occupied three-quarters of the tumour in S group, whereas only 44% in C group ( $p < 0.0001$ ). On the other hand, the proportion of mucinous carcinoma was only 4% in S group, and that was 40% in C group ( $p < 0.0001$ ). The clinical stage according to the Union for International Cancer Control classification was 4%/8%/39%/12%/39% (stage 0/1/2/3/4) in S group, and that was 3%/14%/35%/29%/19% in C group, and the proportion of stage 4 was significantly higher in S group. Although the resection rate was higher in S group than in C group (98% vs 87%;  $p = 0.0055$ ), the prognosis was equivalent (41% were alive in S group and 44% in C group).

**Conclusions/Discussion:** Compared with patients in C group, patients in S group were older at the diagnosis of cancer detection and the onset of Crohn's disease. In S group, less proportion of cancer was detected preoperatively and more proportion of patients had metastasis. We should always give attention not to miss small bowel cancer at CD operation.

#### LAPAROSCOPIC APPROACH IMPROVES OUTCOMES COMPARED TO OPEN SURGERY IN CROHN'S DISEASE: RESULTS FROM AMERICAN COLLEGE OF SURGEONS (ACS) NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM (NSQIP) DATABASE.

P498

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**Purpose/Background:** The role of laparoscopic surgery in the spectrum of Crohn's disease of the small intestine and colon has yet to be established. Prior studies have explored the differences in perioperative outcomes between laparoscopic and open surgery in patients with Crohn's disease without reliable conclusions. Our objective was to determine if there was a difference in perioperative outcomes following laparoscopic compared to open surgery in Crohn's disease.

**Methods/Interventions:** Utilizing the 2010-2014 American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) database, we

examined patients with Crohn's disease to evaluate the difference between laparoscopic versus open surgery. Patients with the preoperative diagnosis of Crohn's disease were identified from the NSQIP database using ICD-9-CM codes (555.0, 555.1, 555.2, and 555.9) and stratified into 2 groups, laparoscopic or open surgery. Multivariate analyses were performed for major and minor perioperative outcomes while adjusting for patient characteristics, comorbidities, and type of operation performed.

**Results/Outcome(s):** A total of 9,509 patients were identified as having the diagnosis of Crohn's disease, of which 3,935 patients (41%) underwent laparoscopic surgery. A steady increase in the usage of a laparoscopic approach from the year 2010 (34%) to 2014 (46%) was also observed. Patients who underwent laparoscopic surgery were younger, tended to be females, were more likely to be on corticosteroids, had an ASA class of I or II, and the cases were more often clean-contaminated. Multivariate analysis (Table 1) showed that the laparoscopic approach was associated with significantly less incidence of wound disruption (aOR=0.44,  $p=0.002$ ), less incidence of inability to wean from ventilator for greater than 48 hours (aOR=0.59,  $p=0.048$ ), renal insufficiency (aOR=0.41,  $p=0.038$ ), urinary tract infection (aOR=0.68,  $p=0.015$ ), decreased incidence of hemorrhage (aOR=0.49,  $p<0.001$ ), sepsis (aOR=0.71,  $p=0.001$ ), and surgical site infection (aOR=0.67,  $p<0.001$ ). The laparoscopic approach was also associated with a shorter LOS (-1 day,  $p<0.001$ ), days from operation to discharge time (-1 day,  $p<0.001$ ), while only having a slight increase in operation time (3 minutes,  $p=0.001$ ).

**Conclusions/Discussion:** Based on the review of the NSQIP database, patients with Crohn's disease who underwent laparoscopic surgery had significantly superior outcomes when compared to patients who underwent open surgery. The laparoscopic approach was associated with less complications and decreased LOS while sacrificing an average of 3 minutes of operation time. The results of this study lends support for utilizing a laparoscopic approach in patients with Crohn's disease who require surgical intervention.

#### HISTOPATHOLOGICAL CHARACTERISTICS OF COLORECTAL CANCER IN CROHN'S DISEASE AND ULCERATIVE COLITIS: 25 YEAR EXPERIENCE IN A SINGLE TERTIARY REFERRAL CENTRE.

P499

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**Purpose/Background:** The colorectal cancer (CRC) pathway in inflammatory bowel disease (IBD) is not completely understood, and there are few studies that examine the histopathological characteristics of CRC

in IBD. There have been reports of association between CRC in IBD colitis with microsatellite instability and hypermethylation.

**Methods/Interventions:** 34 patients with CRC and IBD were identified from a CRC database at a tertiary referral institution (n = 3177) from 1990-2015. These data were then cross-checked with the 'Sydney IBD cohort' - a longitudinal cohort of patients with Crohn's disease (CD) and ulcerative colitis (UC) which included IBD patients from our institution since 1970. Colorectal surgeons from the unit were also sought to recruit patients with IBD-related CRCs potentially missed in the database. In total, 15 patients with CD and 19 with UC were identified. Histopathological information was available for all CD patients, but six were missing in the UC group, and these were excluded from analysis. The following data was collected: site, T and N staging, grade, presence of mucin, lymphovascular invasion, perineural invasion, microsatellite instability, tumour infiltrating lymphocytes and dysplasia.

**Results/Outcome(s):** Of 15 patients with CD and CRC were 8 were male and 7 female. The mean age at the time of CRC diagnosis was 56.9 years (range 29 - 82 years). The site of CRC was 46.6% right-sided or transverse, 40% rectal, 13.3% sigmoid. Majority had advanced stage (T3/4 93.3%, nodal involvement 57.1%). Majority were high or intermediate grade (93.3%), with only 1/15 (6.7%) well differentiated. 26.7% were mucinous. 33.3% had lymphovascular invasion, 46.7% had perineural invasion. Only 1/12 (8.3%) was microsatellite unstable, with most having intact mismatch repair staining (91.7%). Of 13 patients with UC and CRC, 10 were male and 3 female. The mean

age of CRC diagnosis was 64.5 years (range 24 - 86 years). The site of CRC was 46.1% right-sided or transverse, 38.5% rectal, 7.7% left colon, 7.7% sigmoid. Majority had advanced stage (T3/4 69.2%, nodal involvement 23.1%). 92.3% high or intermediate grade. 1/13 (7.7%) was well differentiated. 3/9 (33.3%) had lymphovascular invasion and one (11.1%) had perineural invasion. Only one patient had microsatellite instability (MSI-H). When both groups were combined, only 2 patients with CRC associated with IBD was MSI-H and only 2 patients had tumour infiltrating lymphocytes (TILs). 66.7% had associated or adjacent dysplasia.

**Conclusions/Discussion:** CRC in IBD is associated with advanced stage, high grade and dysplasia. Adverse features such as lymphovascular invasion, perineural invasion, lymph node metastases and mucin is common. This study does not support the MSI replication error repair pathway as a mechanism of carcinogenesis in IBD. Tumour infiltrating lymphocytes do not feature prominently in CRCs associated with IBD.

**P498 Table 1. Multivariate analysis of CD patient categorical outcomes comparing laparoscopic and open surgical approaches while adjusting for age, female, emergency, diabetes, smoke, COPD, operation location, wound class, and ASA class.**

Outcome	Lap vs. Open aOR* (95% CI)	P-Value
Mortality	0.59 (0.25 - 1.41)	0.235
Reoperation	1.01 (0.84 - 1.21)	0.922
Septic Shock	0.79 (0.50 - 1.23)	0.298
Sepsis	0.71 (0.59 - 0.87)	0.001
Hemorrhage	0.49 (0.41 - 0.57)	<0.001
Surgical Site Infection	0.67 (0.59 - 0.76)	<0.001
Wound Disruption	0.44 (0.27 - 0.74)	0.002
MI	0.45 (0.13 - 1.57)	0.210
Stroke/CVA	1.99 (0.35 - 11.23)	0.434
Pneumonia	0.85 (0.60 - 1.22)	0.387
DVT	1.06 (0.73 - 1.54)	0.751
Pulmonary Embolism	0.83 (0.44 - 1.55)	0.555
Ventilator > 48h	0.59 (0.35 - 0.99)	0.048
Acute Renal Failure	0.88 (0.35 - 2.20)	0.786
Renal Insufficiency	0.41 (0.18 - 0.95)	0.038
Urinary Tract Infection	0.68 (0.50 - 0.93)	0.015

### CLINICAL OUTCOMES OF PATIENTS WITH ULCERATIVE COLITIS WHO UNDERWENT RESTORATIVE PROCTOCOLECTOMY WITH IPAA OR COLECTOMY WITH IRA.

P500

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**Purpose/Background:** Restorative proctocolectomy with ileal pouch-anal anastomosis (IPAA) is the most commonly performed operation for patients with ulcerative colitis (UC) because of the acceptable long-term functional outcomes in the large majority of patients. However IPAA still has risks of anastomotic failure, pelvic sepsis and developing pouchitis. On the other hand, total colectomy with ileorectal anastomosis (IRA) requires less complex techniques with lower complication rate and provides good functional outcomes that have been considered as a treatment of choice for a selected group of UC patients. Since patients who underwent IRA have a higher risk of developing neoplasia than those who underwent IPAA, strict surveillance colonoscopy should be performed after the primary surgery. The aim of this study was to clarify the clinical course of the patients who underwent IPAA or IRA. Especially we clarified the cumulative rate of developing pouchitis after IPAA and clarified the cumulative rate of developing neoplasia after IRA.

**Methods/Interventions:** We evaluated 131 UC patients who underwent either IPAA or IRA in our institution between 1965 and 2016 by reviewing medical and endoscopic records. All patients underwent surveillance colonoscopy at least once after surgery. Presence of pouchitis, cumulative rate of pouch failure, the risk of developing neoplasia and the clinical course of patients who developed neoplasia after IRA or IPAA were evaluated. Pouchitis was defined as modified PDAI score of 5 points or more. We retrospectively reviewed endoscopic and pathological findings to assess the development of neoplasia. The clinical features and clinical course of patients who developed neoplasia after IRA or IPAA were retrospectively reviewed.

**Results/Outcome(s):** Among 131 patients, 31 patients underwent IRA and 100 patients underwent IPAA. There were no statistic differences between IRA group and IPAA group for sex, age at onset, or age at surgery. Twenty-three patients developed pouchitis after IPAA. The cumulative rate of pouchitis at 5 and 10 years was 12.5% and 22.8% respectively. The presence of extraintestinal manifestations was an independent risk of developing pouchitis ( $p < 0.05$ ). Neoplasia was detected in seven patients during postoperative surveillance colonoscopy. Among them neoplasia was found in six of 31 patients in IRA group and in one of 100 patients in IPAA group. Neoplasia was detected more frequently in the IRA group than in the IPAA group. The cumulative rate of developing neoplasia was 7.4% and 18.6% at 10 and 20 years after IRA respectively.

**Conclusions/Discussion:** The presence of extraintestinal manifestations was an independent risk of developing pouchitis after IPAA. The cumulative incidence of neoplasia after IRA in UC patients was 18.6% after 20 years. IRA should be performed in selected patients and strict surveillance colonoscopy with biopsies is important.

### EXPERIENCE IN THE USE OF BIOLOGICAL THERAPY IN INFLAMMATORY BOWEL DISEASE IN A COLORECTAL SURGERY SERVICE IN MEXICO.

P501

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**Purpose/Background:** INFLAMMATORY BOWEL DISEASE IS A GROUP OF COMPLEX GASTRO-INTESTINAL DISEASE CHARACTERIZED BY STATE OF CHRONIC INFLAMMATORY OF INTESTINAL WALL. THE ETIOLOGY OF IBD IS STILL UNKNOWN, BUT IS THOUGHT TO ENVIRONMENTAL AND GENETICS FACTORS LEAD TO AN ABERRANT MUCOSAL IMMUNE RESPONSE AGAINST GUT MICROBIOTA. THE ANTI TNF MONOCLONAL ANTIBODIES ARE EFFICACIOUS AGENTS FOR THE TREATMENT IN INFLAMMATORY BOWEL DISEASE, THEY HAVE SHOWN TO BE EFFECTIVE IN THE INDUCTION TO CLINICAL REMISSION, THE MAINTENANCE, MUCOSAL HEALING AND CORTICOSTEROID SPARING, THUS REDUCING THE HOSPITALIZATION RATES, NEED OF SURGERY AND IMPROVING THE QUALITY OF LIFE OF PATIENTS.

**Methods/Interventions:** THE MANUSCRIPT WAS MADE IN THE NATIONAL MEDICAL CENTER LA RAZA IN MEXICO CITY. THE LIST OF PATIENTS OF THE COLORECTAL SURGERY SERVICE WHO RECEIVED THEIR LAST DOSE IN NOVEMBER 2016 WAS PROVIDED BY THE BIOLOGICAL THERAPY CONTROL CENTER OF OUR HOSPITAL. A TOTAL OF 8 PATIENTS WERE STUDIED.

**Results/Outcome(s):** 5 PATIENTS (62.5%) PRESENTED ENDOSCOPIC AND HISTOLOGICAL FEATURES COMPATIBLE WITH CROHN DISEASE, THE REST OF THEM WERE DIAGNOSED WITH ULCERATIVE COLITIS. IN UC GROUP WERE FOUND 2 FEMALES AND 1 MALE, AND IN CD GROUP WE FOUND 3 FEMALES AND 2 MALES. THE MEAN AGE OF THE PATIENTS WAS 50.6 YEARS IN CD GROUP, AND 38.6 YEARS (31-46) IN UC. 100% OF PATIENTS WITH CD PRESENTED MODERATE ACTIVITY AT THE ONSET OF TREATMENT, WITH AN AVERAGE CDAI OF 375 POINTS. IN TERMS OF ENDOSCOPIC ACTIVITY, 80% PRESENTED MAYO SCORE OF 3,

AND THE REST OF THEM HAD MAYO 2. THE LOCATION WAS L3 IN 40% OF PATIENTES AND L2 FOR THE 60%. THE PREDOMINANT BEHAVIOR OF DISEASE WAS PB3 IN 60% OF INDIVIDUALS. ALL OF PATIENT WITH CD RECEIVED ADALIMUMAB DURING THE INDUCTION PHASE: 160MG/80MG AND FOR THE MAINTENANCE PHASE THEY RECEIVED 40MG DOSE EVERY 2 WEEKS. FOLLOW-UP WAS MADE ON THE BASIS OF THE LATEST STUDIES PERFORMED ON PATIENTS, THE MEDIA CLINICAL ACTIVITY WAS 93.4 POINTS OF CDAI SCORE, ENDOSCOPICALLY 80% OF INDIVIDUALS PRESENTED REMISSION AND 20% HAD MILD ACTIVITY. IN THE UC GROUP, 33.4 % PRESENTED MODERATE ACTIVITY AND 66.6% SEVERE DISEASE EVALUATED WITH TRUELOVE WITTS SCORE AT BEGINING OF THE TREATMENT. 100% OF UC PATIENTS SHOWN SEVERE ACTIVITY IN ENDOSCOPIC EVALUATION AND THE BIOPSY DEMONSTRATED INTENSE ACTIVITY. TWO PATIENTS RECEIVED INFLIXIMAB IN WEEK 0, 2 AND 6 FOR THE INDUCTION PHASE, THEN THEY CONTINUED EVERY 8 WEEKS FOR THE MAINTENANCE THERAPY. IN THE FOLLOW UP 66.6% PRESENTED MILD CLINICAL ACTIVITY AND IN THE 33.4% MODERATE ACTIVITY BY TRUELOVE WITT SCORE. ENDOSCOPICALLY THEY ACHIEVED MILD ACTIVITY IN 66.6% OF CASES

**Conclusions/Discussion:** THE COLORECTAL SURGEON PLAYS A PRIMARY ROLE IN THE INTEGRAL MANAGEMENT OF THIS TYPE OF PATIENTS. WE HAVE LEARNED NOT ALL IBD PATIENTS SHOULD BE MANAGED WITH SURGERY, WE OFFER MULTIDISCIPLINARY MANAGEMENT IN ORDER TO DECREASE MORBIMORTALITY AND IMPROVING QUALITY OF LIFE.

#### **PERISTOMAL PYODERMA GANGRENOSUM: 12 YEAR EXPERIENCE IN A SINGLE TERTIARY REFERRAL CENTRE.**

P502

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**Purpose/Background:** Peristomal pyoderma gangrenosum (PPG) is an unusual but potentially devastating condition that is difficult to diagnose and manage. Due to its rarity, it is often misdiagnosed and there is often a delay in appropriate management. There is scarcity of relevant literature on this topic, with mainly case reports and a few case series.

**Methods/Interventions:** 1295 consecutive patients with stomas followed up at a stomal care clinic in a single institution were identified through a prospectively collected

stomal therapy database over a 12 year period between 2005 and 2016. During this period, 12 (0.9%) patients with PPG were identified. The following data were collected: gender, age, association with inflammatory bowel disease (IBD), autoimmune conditions, duration between stoma formation and PPG diagnosis, involvement of dermatologist, length of stay (if inpatient management), biopsy, time to complete healing, management strategies and recurrence of PPG.

**Results/Outcome(s):** Of 12 patients with pyoderma gangrenosum, all were female. The mean age at the time of diagnosis of PPG was 31.5 years (range 10 – 68 years). Six (50%) were associated with Crohn's disease, four (33.3%) with ulcerative colitis and two (16.7%) patients did not have IBD. Of the non-IBD cases, one patient had autonomic neuropathy and the other patient had bladder malignancy and multiple laparotomies and necrotizing fasciitis prior to development of PPG. The median duration for days between stoma formation and PPG diagnosis was 101.5 days and the mean duration was 670 days (range 14 – 2641 days). Nearly all patients (91.7%) were referred to a dermatologist with the mean time to referral 4.0 days (range 0-11 days). Majority (66.7%) were managed in an outpatient setting. For those requiring inpatient management, the mean length of stay was 13.5 days (range 3 – 31 days). 4 patients had a biopsy, 8 patients were diagnosed with PPG by a dermatologist without biopsy. A range of oral and topical steroids, steroid injections, dressings, anti-inflammatories, antibiotics, tacrolimus and analgesia was used in the management of PPG. All patients achieved complete healing of PPG, with only one patient developing recurrence of PPG. The mean duration of time to achieve complete healing of PPG was 282 days (range 28 – 1751 days).

**Conclusions/Discussion:** PPG is a rare and difficult condition to manage. Nearly all cases in this series were associated with IBD or autoimmune causes. There was a mean delay of over 3 months between formation of stoma and development of PPG. A range of steroids, immunosuppressants, analgesia, oral antibiotics and anti-inflammatories may be used in the management of PPG. Recurrence after complete healing was uncommon. The average duration to complete healing of PPG was approximately 9 months. PPG is a complex condition to manage, requiring the expertise of an experienced dermatologist and stomal therapist.



### RECTOVAGINAL FISTULA IN CROHN'S DISEASE : A SINGLE CENTER EXPERIENCE.

P503

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**Purpose/Background:** Rectovaginal fistula (RVF) is a disastrous complication of Crohn's disease (CD) that is exceedingly difficult to treat. It is a disabling condition that negatively impacts a women's quality of life. Current treatment algorithms range from observation to medical management to the need for surgical intervention. A wide variety of success rates have been reported for all management options. The choice of surgical repair methods depends on various fistula and patient characteristics, it published success rates vary with initial success being around 50% rising to 80% with repeated surgery. Several surgical and sphincter sparing approaches have been described for the management of rectovaginal fistula, aimed to minimize the recurrence and to preserve the continence

**Methods/Interventions:** A retrospective study was performed of RVF repair operated carried out between 2008 and 2014 in our tertiary centre at the University Hospital of Tor Vergata, Rome, Italy. All the patients were affected by Crohn's disease and underwent surgery for a RVF under the same senior surgeon and were prospective evaluated

**Results/Outcome(s):** All the 43 patients underwent surgery for RVF were affected by Crohn's disease. The median age was 43 years (range 21 – 53). Four different surgical approach was performed: Drainage and seton, Rectal Advancement Flap (RAF), Vaginal Advancement Flap (VAF), Transperineal approach using Porcine Dermal Matrix (PDM), Martius Flap (MF). The median time to success was 6 months (range 2 – 11). None of the patients was lost during the 18 months of follow – up. The failure group rate was 19 % in contrast with the healing rate group that was 81 %. No demographic of disease related factors were found to influence healing

**Conclusions/Discussion:** The case series of this study supports the dogma “there are no absolute rules to treat Crohn's fistula”, there is not a gold standard technique yet however it's mandatory to minimize the recurrence with a

sphincter saving technique. Randomized trials are needed to find a standard surgical approach.

### CLINICO ONCOLOGIC CHARACTERISTICS OF COLORECTAL CANCER PATIENTS WITH INFLAMMATORY BOWEL DISEASE: A COMPARATIVE STUDY WITH COLORECTAL CANCER ONLY PATIENTS.

P504

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**Purpose/Background:** The oncologic outcome of colorectal cancer (CRC) patients with inflammatory bowel disease (IBD) in comparison with that of sporadic CRC patients is still controversial. This study aimed to clarify this issue.

**Methods/Interventions:** Twenty-seven CRC patients with IBD (14 with UC, 7 with CD, and 6 with others) and 81 sporadic CRC patients from a stratified random sampling method were evaluated at Severance Hospital between 2002 and 2015. The medical records of patients were reviewed retrospectively for clinicopathologic features, IBD characteristics, and vital status at the time of the last follow-up evaluation.

**Results/Outcome(s):** A total of 108 patients were analyzed (27 IBD-CRC patients and 81 sporadic CRC patients). Patient comparisons showed that CRC patients with IBD were younger and had a higher proportion of mucinous or signet ring cell carcinomas than sporadic CRC patients. Furthermore, in the IBD-CRC group, disease duration was a risk factor for survival. The 5-year overall survival (OS) and disease-free survival (DFS) were similar between the two groups ( $p = 0.115$ ,  $p = 0.210$ ). However, considering advanced-stage (stages 3, 4) disease, CRC patients with IBD had poorer 5-year OS and DFS compared to sporadic CRC patients ( $p = 0.015$ ,  $p = 0.011$ ).

**Conclusions/Discussion:** In the advanced stage, CRC patients with IBD had poorer oncologic outcomes compared to sporadic CRC patients. By detecting IBD-CRC at an early stage, a similar postoperative outcome to that of sporadic CRC can be expected. Thus, endoscopic surveillance is essential for early detection of CRC in IBD patients.

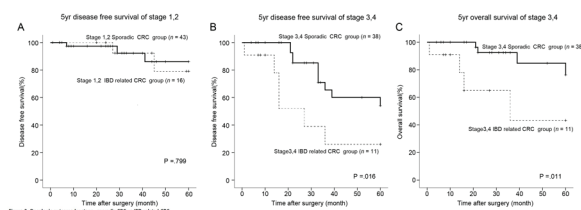


Figure 2. Oncologic outcome by stage-related CRC vs. IBD-related CRC

## MANAGEMENT OF ANAL FISTULA IN CROHN'S DISEASE: REVIEW OF CHARACTERISTICS, DESIGN AND QUALITY OF RANDOMIZED CONTROLLED TRIALS PUBLISHED ON THE LAST 20 YEARS.

P505

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**Purpose/Background:** 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. This study was designed to analyze the characteristics and the quality of reporting of randomized, controlled trials published during the last years on management of anal fistula in patients with Crohn's disease.

**Methods/Interventions:** An electronic search for all RCT on anal fistula management in Crohn's disease from 1996 to 2016 was undertaken by using the MEDLINE database via PubMed. The data collected was divided into general data, characteristics of reporting, methodology quality assessment using the JADAD scale (from 0 to 5) and a validated methodology quality score (MINCIR score from 6 to 36), evaluation of the items published in the CONSORT statement, and the journal impact factor. Reports were divided into two groups in order to study the characteristics and design of the studies according to period of publication: published articles from 1996 to 2009 (Group 1), and published on the last years from 2010 to 2016 (Group 2).

**Results/Outcome(s):** Twenty-five trials were eligible but only 14 fulfilled the inclusion criteria of the study (Group 1, n=7; and Group 2, n=7). These trials, involving overall 1009 patients, have been designed to study medical treatment in 6, surgical therapy in 6 and the remaining 2 regarding diagnosis pathway. The country that published a higher number of studies was U.S.A. (4 studies) followed by The Netherlands (3 studies) and France and Spain (2 studies). Eight studies (57.1%) were designed as double-blind RCT and eight of them (57.1%) were multicentre studies in the overall series. Regarding quality of reports, we found a statistically significant higher MINCIR score in RCTs in Group 2 (There were no significant differences in general characteristics of RCT between the two periods of time. Group 1: 24,43±3,6 vs. Group 2: 30±5,3; p=0.038) but no differences in JADAD scale (p=1.0). Finally, we found higher impact factor of journals that published RCTs during the most recent years (Group 1: 6,29±3,3 vs. Group 2: 15,43±14,3, p=0.040).

**Conclusions/Discussion:** There is a lack of high-quality reported randomized, controlled trials on management of anal fistula in patients with Crohn's disease during the study period. Reports of randomized controlled trials involving patients with anal fistula and Crohn's disease published more recently, were better reported.

## THE FEASIBILITY OF A LAPAROSCOPIC APPROACH TO REOPERATIVE ILEOANAL J-POUCH SURGERY.

P506

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**Purpose/Background:** The standard reoperative surgery approaches include both abdominal and perineal access. However, no previous series have demonstrated the feasibility of a laparoscopic approach for reoperative pouch surgery. This series is an updated, unpublished pilot series presented as a poster at the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) in Boston, on March 17<sup>th</sup> 2016.

**Methods/Interventions:** The objective of this single surgeon cohort was to establish the feasibility of a laparoscopic approach in patients presenting to a tertiary care center with pouch-related conditions necessitating reoperation for repair, revision or excision. Patient demographics and outcomes were retrospectively collected from an IRB approved prospective database and from IRB approved chart review. All procedures were performed by a single surgeon (SDW) with an extensive expertise in laparoscopy and pouch-related complications.

**Results/Outcome(s):** Between 2013 and 2016, 14 laparoscopic reoperative pouch procedures were performed on 11 patients [Familial Adenomatous Polyposis (1/11); Ulcerative Colitis (10/11)] with a mean age of 41.1 years and BMI of 23.6 (18-32) kg/m<sup>2</sup>. 9/11 patients had their initial pouch surgery laparoscopically performed, 1 of who had a subsequent open pouch revision. The median time from the prior procedure was 1007 (2-12562) days. Standard indications included pouch volvulus with obstruction (1/14), pouch related fistulas (5/14), pouch-anastomotic dehiscence (1/14), high-grade dysplasia (1/14), carcinoma (1/14), chronic pouchitis (2/14), pouch-anal anastomotic stricture (1/14), and fecal incontinence (2/14). Procedures included laparoscopic pouch revision or repair (7/14) and laparoscopic pouch excision (7/14). Mean operative time was 273 (107-430) minutes. Three procedures were performed with a total of 3 access ports; 10 procedures used 4 ports and 1 was converted after insertion of the Hasson camera port. Two pre-emptive conversions were made in this series: one for extensive pelvic fibrosis precluding safe dissection and the other for dense intra-abdominal adhesions. Post-operative morbidity was minimal: 1 wound infection, 2 postoperative pelvic fluid collections and

1 intra-abdominal collection. All collections were successfully drained through percutaneous imaging techniques. Median length of stay was 9.5 (3-24) days.

**Conclusions/Discussion:** Our series demonstrates laparoscopic reoperative pouch surgery to be a feasible approach by surgeons who practice high-volume minimally invasive and pouch-related surgery. Despite long operative times, patients can still benefit from the advantages of a minimally invasive approach.

### APACHE-II SCORE AS PREDICTOR OF PERFORATION IN PATIENTS WITH ULCERATIVE COLITIS.

P507

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**Purpose/Background:** Patients with ulcerative colitis (UC) and perforation present a 27-80% morbidity and mortality rates. Early diagnosis and surgical management may decrease this rate up to 2-8%. We identify risk factors, and evaluate APACHE-II and CR-POSSUM scores as predictors of colonic perforation and mortality in surgical patients with UC.

**Methods/Interventions:** We included 115 patients who underwent an elective or emergency surgery for ulcerative colitis from 1980 to 2016 in a referral center in Mexico City. Patients were analyzed in two groups: 1) Perforated group, and 2) Non-perforated group. Risk factors to predict perforation were included in a univariate and multivariate analysis. The sensibility and specificity using ROC curve analysis of APACHE-II and CR-POSSUM models to predict perforation and mortality were calculated. A subgroup analysis of severe colitis patients with and without perforation was performed. Results are expressed as the median or mean  $\pm$  standard deviation. Chi-square test was used for non-parametric variables and the Fishers exact test for the quantitative measurements. Receiver operating characteristics (ROC) curve analysis was used to assess the accuracy of each predictive model, the sensitivity and specificity was obtained for perforation and mortality. All statistical calculations were performed with the aid of a computer program (SPSS version 16, SPSS Inc. Chicago Illinois, USA). A  $p$  value  $< 0.05$  was significant.

**Results/Outcome(s):** Ninety-eight patients were included in the non-perforated group, and 17 in the perforated group. Overall, patients with perforation showed higher morbidity (64.7% vs 37.8%;  $p = 0.036$ ) and mortality (29.4% vs 3.1%;  $p=0.002$ ). In the multivariate analysis of patients with severe colitis, only an APACHE-II score  $\geq 7$  was associated with perforation (OR= 32, 95% CI = 2.8 – 374;  $p =0.002$ ). The ROC analyses of an APACHE-II score  $\geq 7$  discriminate perforated from non-perforated patients with an AUC of 0.97

(Sensitivity = 90%, and specificity = 94.1%). The CR-POSSUM score was similar to the APACHE II score to predict mortality (AUC 0.93 and AUC 0.92, respectively). Due to perforation, morbidity and mortality rates were higher in the last decades of our study (1980-1989: 28.5% and 0%, 1990-1999: 32.4% and 2.7%, 2000-2009: 48% and 8.5%, 2010-2016: 45.8% and 12.5%).

**Conclusions/Discussion:** Due to the high risk of perforation, the surgical management of patients with severe ulcerative colitis should be promptly indicated in patients with an APACHE score  $\geq 7$ , and when medical treatment had failed. In our study, mortality rates have been higher due to perforation in last decades.

### BIOMARKERS IN ULCERATIVE COLITIS TO PREDICT COLITIS-ASSOCIATED CANCER: IS THERE A ROLE FOR PEROXISOME-PROLIFERATOR ACTIVATED RECEPTOR (PPAR) DELTA?

P508

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**Purpose/Background:** Ulcerative Colitis is associated with an increased risk of colon cancer. Wang et al have demonstrated in murine models, that PPAR delta may promote colitis associated tumour growth in a COX-2 dependent manner. This study sought to determine whether there may be differences in PPAR delta expression in UC-associated polyps from patients who ultimately developed colon cancer versus those who did not, to determine whether it may have potential as a biomarker.

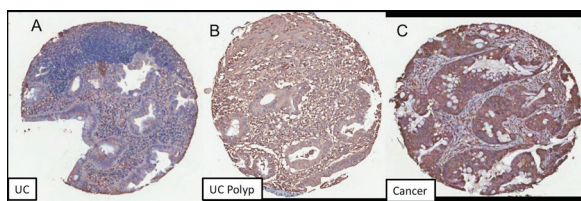
**Methods/Interventions:** Following ethical approval by the institutional review board at St. Vincent's University Hospital, Dublin, Ireland, a pre-existing tissue microarray of formalin fixed tissue from surveillance colonoscopies and colectomy specimens from Ulcerative Colitis patients who did and did not progress to either dysplasia or cancer was utilized. Immunohistochemistry was performed using 1:100 dilution of polyclonal rabbit PPAR delta primary antibody diluted in PBS with normal goat serum (NBP1-39684, Novus Biologicals). Staining was scored manually by two observers, on an intensity score from 0 to 3, and the mean score for each tissue calculated. Percentage staining was also recorded. Interobserver agreement was examined using Cohen's Kappa Co-efficient. Difference between means was evaluated using ANOVA, and difference in percentage high PPARdelta was evaluated using Chi squared test.

**Results/Outcome(s):** In total 788 cores of tissue were stained (n=103 grouped samples from 183 initial tissue blocks from 87 patients). 62% of tissue cores were co-scored (H Mohan, E Ryan). There was a high degree of inter-observer agreement ( $\kappa=0.69$ ). Nearly all PPAR delta staining was in the cytoplasm, in keeping with



previous studies. (Yang et al, Clinical Cancer Research 2011) There was reduced expression of PPAR delta in UC compared to non-UC samples. Among UC tissue samples there was no significant difference in staining between those with and without dysplasia (UC progressor polyp 2.00, UC progressor normal 2.15, UC non-progressor 2.15  $p=0.813$ ). There was a modest increase in PPAR delta expression in normal versus matched tumour tissue (mean 2.74 versus 2.44,  $p=0.007$ ).

**Conclusions/Discussion:** Further research is needed to fully elucidate the role of PPAR delta in UC associated colon cancer. However, this study does not provide evidence to support consideration of PPAR delta as a biomarker in UC associated colon cancer.



Representative images from TMA: A) Ulcerative Colitis Tissue, B) UC Polyp,

C) Cancer. All images taken at 5X using Aperio ImageScope Viewer

## RECTAL CANCER IN INFLAMMATORY BOWEL DISEASE: DO PATIENTS HAVE WORSE PROGNOSIS THAN NON-IBD PATIENTS?

P509

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**Purpose/Background:** Patients with longstanding inflammatory bowel disease (IBD) are at a known increased risk for rectal cancer due to chronic inflammation. However, little is known regarding the optimal treatment approach and associated oncologic outcomes as compared to non-IBD patients. We herein sought to determine 1) tolerance of neoadjuvant therapy in the setting of IBD, and 2) oncologic outcomes as compared with non-IBD patients.

**Methods/Interventions:** The cancer registry was queried for all cases of rectal adenocarcinoma treated at our institution between 1995 and 2010. The list of patients was then searched for the diagnosis of chronic ulcerative colitis (CUC) (ICD-9: 556 and ICD-10: K51) and Crohn's disease (CD) (ICD-9: 555 and ICD-10: K50). We identified 33 patients with IBD and rectal cancer treated at our institution. A matched control cohort of 33 non-IBD patients was constructed matching for age, sex, and TNM stage at time of surgery. Data collected included baseline demographics, preoperative and pathologic variables, cancer treatment, and oncologic outcomes. Long-term oncologic outcomes among IBD and non-IBD patients were compared.

**Results/Outcome(s):** In the IBD cohort of 33 patients (24 male, 73%), median age was 54 years (range 25-76). For the control cohort of 33 non-IBD rectal cancer patients (24 male, 73%), median age was 54 years (range 21-75). Fifteen IBD patients (45%) had CUC, 15 (45%) had CD and 3 (10%) had indeterminate colitis (IC). The median duration of IBD prior to the rectal cancer diagnosis was 21 years (range 0-44 years). At the time of rectal cancer diagnosis, 9 IBD patients (27%) were receiving biologic therapy, 7 (21%) were taking steroids, and 5 (15%) were on immunomodulators. The median time lapse between last screening colonoscopy and diagnosis of rectal cancer was 12 months (range 1-72 months) for the IBD patients and 60 months (range 48-108 months) for the non-IBD controls ( $p=0.0009$ ). Seventeen IBD patients (52%) and 16 (48%) non-IBD patients received neoadjuvant chemoradiotherapy, and none had to delay or stop treatment due to complications. Thirty-one IBD cases and 32 non-IBD controls underwent definitive oncologic surgery for rectal cancer. Pathologic TNM stage was not different between IBD cases and controls ( $p=0.8432$ ; cases stage 0-3, I-12, II-5, III-9, IV-4; controls stage 0-1, I-13, II-7, III-9, IV-3). Overall survival ( $p=0.9969$ ), disease-free survival ( $p=0.3219$ ), and time to recurrence ( $p=0.9872$ ) were not different between IBD cases and controls (Table 1).

**Conclusions/Discussion:** Patients with IBD who develop rectal cancer have good overall and disease-free survival outcomes with multimodal therapy, and these outcomes are comparable to age/sex/TNM stage-matched non-IBD controls. All patients tolerated neoadjuvant radiation therapy despite their IBD diagnosis.

Table 1: Survival Outcomes

	IBD Cases	Non-IBD Controls	p value
Overall survival, %			0.9969
1 year	96.4	96.4	
3 year	90.0	96.4	
5 year	90.0	96.4	
Disease-free survival, %			0.3219
1 year	85.4	96.7	
3 year	61.5	81.0	
5 year	61.5	71.2	
Time to recurrence, years	1.1	2.4	0.9872

**CONCOMITANT CLOSTRIDIUM DIFFICILE INFECTION AND CHRONIC ULCERATIVE COLITIS AT TIME OF COLECTOMY MAY BE ASSOCIATED WITH POOR LONG-TERM OUTCOMES FOLLOWING ILEAL POUCH- ANAL ANASTOMOSIS.**

P510

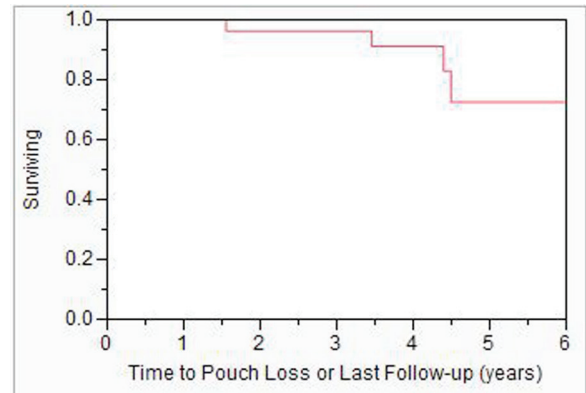
S. Moncrief, A. Lightner, J. Pemberton, K. Mathis  
Rochester, MN

**Purpose/Background:** The incidence of *Clostridium difficile* infection (CDI) among patients with chronic ulcerative colitis (CUC) is increasing. We aimed to examine long-term pouch outcomes following proctocolectomy and IPAA in patients with medically refractory CUC and concomitant CDI.

**Methods/Interventions:** We included consecutive patients undergoing colectomy for medically refractory CUC and positive PCR-stool test for CDI within 30 days prior to colectomy from 2007 to 2012.

**Results/Outcome(s):** Thirty-two patients were included (18 female, 56%) with a median age of 33 years (range 17-59). Preoperative diagnosis was CUC in 30 (94%) and indeterminate colitis in 2 (6%). Ninety-one percent of patients were receiving steroids, 50% biologics, 28% immunomodulators, and 3% other immunosuppressants at time of colectomy. All patients were receiving treatment for CDI at the time of colectomy with metronidazole and/or oral vancomycin. Twenty-five (78%) were inpatients at time of colectomy. All patients underwent three-stage IPAA. IPAA's were performed at a median of 3 months and subsequently all ileostomies were reversed at a median of 3 months. At a median follow-up of 4.5 years, 3 patients (9%) had a new diagnosis of Crohn's disease of the pouch, 4 (13%) had chronic pouchitis requiring daily antibiotics, and 12 (38%) had recurrent episodes of pouchitis. Four patients (13%) required IPAA excision or permanent diversion due to Crohn's disease (n=3) or chronic pouchitis (n=1). CDI recurred in the pouch in 3 patients (9%). One, 3, and 5 year pouch survival was 100%, 96% and 73%, respectively (Figure 1).

**Conclusions/Discussion:** We have seen an increasing number of patients with CDI and refractory CUC undergoing three-stage colectomy and IPAA in our practice. It appears that long-term pouch complications and morbidity may be increased in this select cohort. More study is necessary to determine the association of CDI with the high rate of pouch failure and dysfunction.



IPAA Survival with CDI

**REVISION OF AN ILEAL POUCH ANAL ANASTOMOSIS PERFORMED FOR CHRONIC ULCERATIVE COLITIS IS ASSOCIATED WITH GOOD FUNCTION AND POUCH SALVAGE.**

P511

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Rochester, MN

**Purpose/Background:** Proctocolectomy with ileal pouch anal anastomosis (IPAA) is the preferred operation for chronic ulcerative colitis (CUC). While IPAA has a low reported morbidity and good long term functional outcomes, a subset of patients will develop complications resulting in poor function threatening pouch viability. To salvage, patients may undergo pouch revision. We evaluated outcomes in patients who underwent an IPAA for CUC or indeterminate colitis (IC) whom later required pouch revision.

**Methods/Interventions:** We retrospectively reviewed all patients who underwent pouch revision at our institution between 1981 to 2015. Patients were included if their original IPAA was performed for CUC/IC. Patients were excluded if revision consisted of only anal dilation or placement of seton. Functional outcomes were assessed using the standardized post IPAA survey.

**Results/Outcome(s):** We identified eighty-one patients whom underwent IPAA revision. The original IPAA was performed for CUC (87.7%) or IC (12.3%). The most common configuration of the initial IPAA was a J-pouch (86%) with a hand-sewn anastomosis (68%), and diverting loop ileostomy (91%). Forty patients (45%) had a post-operative complication after their original IPAA, most commonly classified as a pelvic abscess (n=18;48%). Prior to revision, 45 patients (59%) underwent an operation related to pouch dysfunction, the most common of which was construction of a diverting loop ileostomy (n=21;47%) and repair of a pouch fistula (n=17;38%). Indications for pouch revision were either inflammation/infectious (66%) or mechanical (33%;fig1). The mean duration between the original IPAA and subsequent revision was 6.3 years (range .1-29.8). Seventy percent had no

postoperative complications after revision. Median follow up after revision was 40 months (range 1–292); during that time, 15 patients (23%) experienced pouch failure, two thirds were due to a diagnosis of Crohn's disease of the pouch (n=10). Of the 30 patients (37%) who had CD of the pouch, 30% required pouch excision compared to the 12% of those with CUC or IC. Pouch failure following revision was significantly associated with septic complications at the time of the original IPAA and recurrent fistulas following pouch revision ( $p < .05$ ). Long term functional assessment following pouch revision was available for 35% (n=28) of patients. At a mean follow up of 10.2 years (range 1.4–26.5), patients reported approximately 6 daytime stools and 2 at night. Daytime incontinence was reported as never in 36%, occasional in 50%, and frequent in 7%; nighttime incontinence was reported as never in 29%, occasional in 43%, and frequent in 32%.

**Conclusions/Discussion:** IPAA revision is associated with low complication and high pouch salvage rates in patients diagnosed with CUC/IC. Long term function is comparable to patients undergoing an initial IPAA. A diagnosis of CD following IPAA portends a worse prognosis.

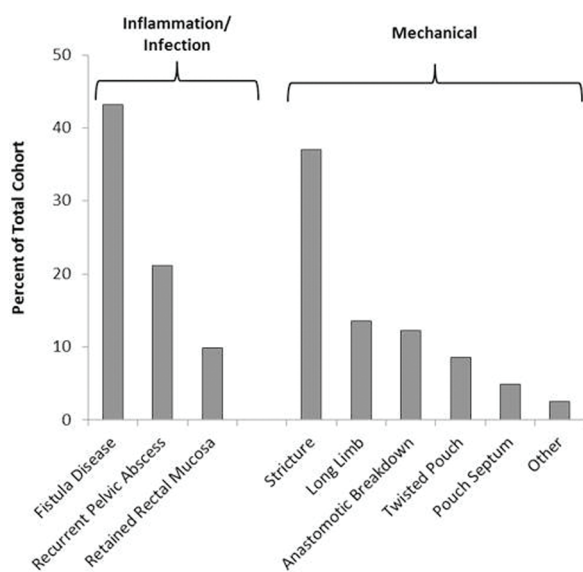


Figure 1. Indications for pouch revision

## COMPARISON OF ANASTOMOSIS RELATED COMPLICATIONS BETWEEN INTRACORPOREAL AND EXTRACORPOREAL ILEOCOLIC ANASTOMOSES.

P512

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**Purpose/Background:** Foreshortened mesentery or thick abdominal wall constitutes the rationale for laparoscopic intracorporeal ileocolic anastomoses (ICA). The aim of this study was to compare intracorporeal ICA to extracorporeal ICA in terms of anastomotic-related perioperative complications in patients with Crohn's ileitis and obese patients with right colon cancer.

**Methods/Interventions:** This was a prospective non-randomized surgeon's trial enrolling consecutive patients with Crohn's terminal ileitis or with right colon cancer plus a BMI over 30 undergoing elective laparoscopic right colon resection with intracorporeal ICA by one surgeon and extra-corporeal ICA by another surgeon. Propensity score matching with a 1:1 ratio was employed to compare diagnosis-matched patients for age, BMI, ASA, and previous abdominal surgery. Anastomosis-related perioperative complications included anastomotic leak, surgical site infections, and related re-interventions.

**Results/Outcome(s):** Overall 453 patients were enrolled: 233 intracorporeal vs. 220 extracorporeal. Propensity score matching left 195 intracorporeal and 195 extracorporeal patients comparable for age ( $p=0.294$ ), gender ( $p=0.683$ ), ASA ( $p=0.545$ ), BMI ( $p=0.079$ ), previous abdominal surgery ( $p=0.348$ ), and diagnosis ( $p=0.301$ ). Operating time between IC and EC were  $132 \pm 37$  min and  $140 \pm 36$  min. Conversion rates (5.1% vs. 3.6%  $p=0.457$ ), and intraoperative complications (1% vs. 2.1%  $p=0.45$ ) were not related to the anastomosis. The rate of complications was higher in extracorporeal patients (5.1% vs. 12.8%  $p=0.008$ ). Anastomotic leak (0.5% vs. 1.5%  $p=0.623$ ), and re-operation rates (1% vs. 3.6%  $p=0.106$ ) did not differ. SSI rates were higher after extracorporeal anastomoses (1% vs. 4.6%).

**Conclusions/Discussion:** Patients with Crohn's ileitis and obese patients with right colon cancer undergoing intracorporeal ICA had fewer anastomosis-related complications as compared to their extracorporeal counterparts.

### CROHN'S DISEASE PATIENTS ARE AT INCREASED RISK OF ANASTOMOTIC LEAK AFTER ELECTIVE ILEOLECTOMY DUE TO MODIFIABLE PREOPERATIVE RISK FACTORS.

P513

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**Purpose/Background:** Many patients with Crohn's Disease (CD) will require ileocelectomy during their disease course. Anastomotic leak (AL) after bowel resection is a dreaded complication with significant cost to the patient and healthcare system. This study aims to determine if patients with CD are at higher risk of AL than those with malignancy. Additionally, we aimed to identify factors associated with AL after ileocelectomy.

**Methods/Interventions:** The National Surgical Quality Improvement Program (NSQIP) database was queried for all patients undergoing elective ileocelectomy for either CD or neoplastic disease (including polyps) from 2013 to 2015. Using the newly described definition of AL by NSQIP, the AL rates for each group were compared. The occurrence of AL was modeled using multivariable logistic regression as a function of disease type, patient demographics, comorbidities, and preoperative characteristics.

**Results/Outcome(s):** 14,480 patients were identified, with 12,042 undergoing ileocelectomy for malignancy or polyp and 2,438 for CD. The overall AL rate was 2.6%. On univariate analysis, the AL rate in CD patients was found to be significantly higher than in patients with neoplastic disease (3.7% vs 2.3%,  $p < 0.001$ ). After logistic regression however, this difference was no longer significant (OR 0.97, 95%CI 0.65-1.46,  $p = 0.888$ ). AL was found to be significantly associated with male sex (OR 1.53, 95% CI 1.24-1.89,  $p < 0.001$ ), higher ASA class (OR 1.44, 95% CI 1.13-1.3,  $p = 0.003$ ), contaminated or dirty wound class (OR 1.66, 95% CI 1.24-2.22,  $p = 0.001$ ), smoking (OR 1.37, 95% CI 1.05-1.79,  $p = 0.019$ ), preoperative weight loss (OR 1.68, 95%CI 1.16-2.43,  $p = 0.006$ ), and preoperative steroid use (OR 1.53, 95% 1.08-2.16,  $p = 0.017$ ). The AL rate for CD patients who were non-smokers, did not have pre-operative weight loss or steroid use was 2.2%, which is similar to that of patients undergoing ileocelectomy for malignancy. When all three of these criteria were present, the leak rate was 7.9%.

**Conclusions/Discussion:** The increased AL rate in CD patients is not inherent to the disease process but rather the sequela of the disease and its treatment. The association of smoking, preoperative steroid use and weight loss with anastomotic leak in CD patients highlights modifiable risk factors. When CD patients without these risk factors undergo elective ileocelectomy, the AL rate is low and similar to those undergoing ileocelectomy for malignancy. The operating surgeon should consider risk factor modification or a diverting ostomy in CD patients with these risk factors. This data emphasizes the importance of preoperative optimization in patients with CD. Additional studies

are needed to determine if alteration of these factors can decrease the AL rate in CD patients undergoing ileocelectomy to that of patients with malignancy.

### ENHANCED RECOVERY PROTOCOLS IN PATIENTS WITH ULCERATIVE COLITIS.

P514

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**Purpose/Background:** Enhanced recovery protocols (ERP) are evidence based, multidisciplinary approaches, to the perioperative management of surgical patients. In colorectal surgery, several studies have demonstrated its utility in improving outcomes for colorectal cancer patients. No study has examined the use of ERP protocols in patients with ulcerative colitis (UC). Historically at our institution, without ERP, median length of stay was 4 to 7 days, 30-day morbidity rate was 33 to 37%, and 30-day readmission rates were 21 to 22%. Our aim was to evaluate the outcomes of patients with UC undergoing colorectal surgery when ERP was implemented as compared to historical data.

**Methods/Interventions:** A retrospective review of a single institution prospectively maintained database from January 2011 to December 2015 was performed. Adult patients with UC undergoing primary colorectal surgery for treatment of disease or the first two stages of a restorative procedure on ERP were included. No stomal closures or revisional surgeries were included. The analysis was performed on an intent-to-treat basis.

**Results/Outcome(s):** Four hundred and thirty-four patients with UC undergoing 550 colorectal operations were included. Patients had a median age of 39 years (IQR 27-55), and 255 (58.7%) were male. Median Body Mass Index (BMI) was 24.9 kg/m<sup>2</sup> (IQR, 21.9-28.9) with an American Society of Anesthesiologists (ASA) physical status classification of 2. Indications for surgery included medically refractory disease (n=448; 81.4%), neoplasia (n=88; 16.0%), and emergent surgery (n=14; 2.5%). The most commonly performed operation was a subtotal colectomy with ileostomy (n=239; 43.4%) followed by proctectomy with ileal pouch anal anastomosis and diverting ileostomy (n=155; 28.2%). Two thirds of the operations employed a minimally invasive approach (laparoscopic, hand-assisted, or robotic). Median operative time was 200 minutes (IQR 159-243). Median length of stay was 3 days (IQR 3-5). Thirty-day overall morbidity rate was 24.9% (n=137). The most common complications were for bleeding requiring transfusion (n=64; 11.6%), ileus (n=59; 10.7%), and anastomotic leak (n=22; 4.0%). Thirty-day reoperation rate was 6.2% (n=34) which were most commonly for: bleeding requiring transfusion (n=12; 2.2%), small bowel obstruction (n=9; 1.6%), and anastomotic leak (n=8; 1.5%). Thirty-day readmission rate was

15.8% (n =85). The most common reasons for readmission were for bleeding requiring transfusion (n=24; 4.4%), ileus (n=20; 3.6%), abscess (n=13; 2.4%), and dehydration (n=13; 2.4%).

**Conclusions/Discussion:** The use of ERP in patients with UC is safe and appears to reduce length of stay, 30-day morbidity, and 30-day readmission rates as compared to historical data. Future investigation should be performed to identify modifiable risk factors to lower 30-day morbidity and readmission rates.

## HOW DOES OBESITY AFFECT SURGICAL DECISION-MAKING IN CANDIDATES FOR AN ILEAL POUCH-ANAL ANASTOMOSIS?

P516

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**Purpose/Background:** Patients with severe ulcerative colitis (UC) usually have staged reconstructive surgery, beginning with total abdominal colectomy (TAC), followed by ileal pouch-anal anastomosis (IPAA). Obesity imposes specific technical challenges in construction of IPAA, and there is a tendency to defer complex reconstructive surgery in obese patients. This study aimed to document the impact of obesity on surgical decision-making in patients who have had TAC for UC.

**Methods/Interventions:** Patients with body mass index (BMI)  $\geq 25$  kg/m<sup>2</sup> at the time of initial surgery who underwent TAC for UC with the intention of subsequent IPAA creation between 01/2010-12/2014 were identified. Demographics, operative characteristics, rate of subsequent IPAA, and postoperative complications were evaluated and patients had constructed IPAA or not were compared.

**Results/Outcome(s):** 261 patients with mean age of 42.5( $\pm 13.9$ ) years [95(36%) female] were candidates for IPAA. 207(79%) patients had IPAA constructed with a median follow-up of 23.9(6-65) months. 54 patients did not have IPAA: 43 had no further surgery, 10 underwent completion proctectomy with end-ileostomy and 1 had ileorectal anastomosis. Most common reasons for not going on to IPAA were patient's choice not willing to proceed (N=21, 40%), or surgeon's requirement that patients lose weight (N=18, 34%). Table shows demographic data and outcomes for TAC procedure according to IPAA creation. Rates of IPAA rose as BMI decreased. While 67% (N=174) of TAC was performed laparoscopically, only 33% (N=59) of the second stage procedures were laparoscopically. Loop ileostomy was created in 93.8% (N=183) of patients during IPAA construction. Pouch-related complication rates were comparable across obesity classes (p=0.73).

**Conclusions/Discussion:** Obesity strongly influences surgical decision making in UC patients who are candidates for IPAA.

### P516 Comparison demographics and operative outcomes between patients who had an IPAA constructed or not

	Patients with IPAA (N=207)	Patients without IPAA (N=54)	P value
Age, year	41 $\pm$ 13	48 $\pm$ 16	0.001
Gender (female)	77 (37%)	18 (33%)	0.59
BMI, kg/m <sup>2</sup>	30.1 $\pm$ 4.4	34.6 $\pm$ 6.7	<0.001
Obesity classification			<0.001
Overweight (25-30)	124 (88%)	17 (12%)	
Obese (30-35)	57 (83%)	12 (17%)	
Morbid obese ( $\geq 35$ )	26 (51%)	25 (49%)	
ASA classification			0.23
II	117 (56.6%)	25 (46.3%)	
III	85 (41.5%)	26 (48.1%)	
IV	3 (1.9%)	3 (5.6%)	
Pulmonary comorbidities	20 (11.4%)	4 (10%)	0.79
Cardiac comorbidities	50 (28.6%)	12 (30%)	0.85
Diabetes mellitus	17 (8.2%)	6 (11.1%)	0.56
Steroid use	86 (49%)	17 (42.5%)	0.42
Hospital stay (day)	7.0 $\pm$ 5.6	8.4 $\pm$ 5.3	0.01
30-day complications after TAC	85 (41%)	21(38.9%)	0.86

Values are reported as mean  $\pm$ SD or absolute values (%). ASA: American Society of Anesthesiologists classification, BMI: Body Mass Index, TAC: Total Abdominal Colectomy.

### IMPACT OF PROSTATE CANCER RADIATION ON THE MULTIDISCIPLINARY MANAGEMENT OF METACHRONOUS RECTAL CANCER.

P517

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**Purpose/Background:** There are unique challenges for the treatment of rectal cancer in patients previously treated for prostate cancer. These patient's previous treatments may limit the treatment options for a metachronous rectal cancer and affect outcomes. The purpose of this study was to examine the impact of the type of prostate cancer treatment on rectal cancer management and oncologic outcomes.

**Methods/Interventions:** All patients with a prior history of prostate cancer treated for primary rectal cancer at a tertiary cancer center during a 14-year period were identified. Clinical, pathologic, and oncologic outcomes were compared for patients treated with and without radiation for prostate cancer using chi-square and Fisher exact test. Overall survival (OS) and disease-free survival (DFS) and local recurrence (LR) were examined.

**Results/Outcome(s):** Forty-eight patients were identified. Median follow-up was 32 months. Twenty-nine patients (60.4%) had received radiation therapy for prostate cancer. Most patients (58.6%) were treated with external beam radiation (EBRT); 37.9% were treated with brachytherapy. Patients with and without previous prostate cancer radiation were similar in clinical and pathologic rectal cancer stage, age, and interval time from prostate to rectal cancer diagnosis. Yet, patients who had received prostate radiation were less likely to have node-positive rectal cancer on initial staging (24.1 vs 52.6%,  $p=0.04$ ) and less likely to receive radiation for rectal cancer (48.3 vs 84.2%,  $p=0.012$ ). Patients previously treated with prostate brachytherapy were significantly less likely to undergo a sphincter preserving resection compared to those treated with EBRT (10% vs 60%,  $p=0.027$ ). Post-operative complication rates did not differ between the two groups. The R0 resection rate in each group was 100%. OS, DFS and LR were not significantly different ( $p=0.35$ , 0.49 and 0.26).

**Conclusions/Discussion:** Radiation treatment for prostate cancer impacts treatment decisions for rectal cancer, particularly regarding radiation. However, similar perioperative and oncologic outcomes can be achieved through a comprehensive multidisciplinary treatment plan incorporating selective re-irradiation and aggressive surgical resection.

### IMPACT OF EARLY ADJUVANT CHEMOTHERAPY FOR STAGE III ADENOCARCINOMA OF THE COLON: AN INTERIM ANALYSIS FROM A RANDOMIZED CLINICAL TRIAL.

P518

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**Purpose/Background:** Surgery followed by adjuvant chemotherapy (ACTx) has been standard treatment for stage III colon cancer since 1990. However, to date, clinical trials have not been conducted to determine the optimal time for initiation of adjuvant systemic chemotherapy. We reported an interim analysis of feasibility and safety in the first 220 cases of 440 cases in a phase III trial of early induction of adjuvant chemotherapy for stage III colon cancer.

**Methods/Interventions:** Between Sep. 2011 and Jan. 2016, 220 patients treated by curative surgery for colon cancer were enrolled in a randomized clinical trial. Group I (Investigational arm) received early ACTx which are initiated within 14 days postoperatively, and Group II (Control arm) received conventional ACTx, which are initiated between 4 and 8 weeks postoperatively. The incidence and severity of perioperative outcomes, toxicity of chemotherapy, and compliance were compared between the group I and group II.

**Results/Outcome(s):** A total of 108 and 112 enrolled patients in early ACTx group and conventional ACTx group have been evaluated. There were no differences in toxicity and compliance rate between two groups. Grade 3/4 toxicities included neutropenia (23.5%), anorexia (7.5%), and febrile neutropenia (5.7%) in early ACTx group and neutropenia (24.3%), anorexia (8.6%), and febrile neutropenia (5.9%) after conventional ACTx group. The incidence of postoperative morbidity within 90 days after surgery was similar in the two groups. Excluding ineligible cases, treatment completion rates were not significantly different between the two groups.

**Conclusions/Discussion:** To date, our study is the largest trial to assess the timeliness of ACTx as a predictor of outcome in stage III colon cancer. Our interim analysis suggests that early ACTx protocol is feasible and safe for the ongoing phase III trial.

### THE PROGNOSTIC SIGNIFICANCE OF TUMOR DEPOSITS IN STAGE III COLON CANCER.

P519

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Hershey, PA

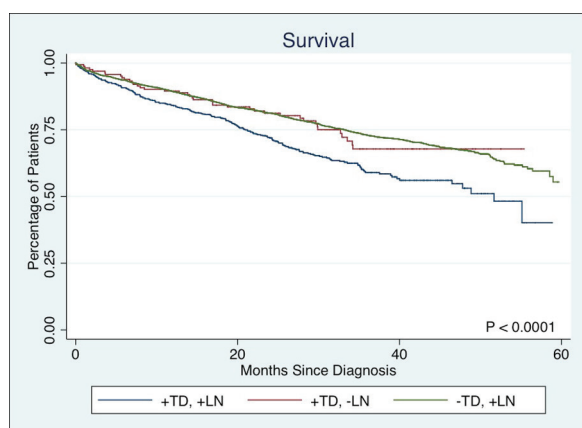
**Purpose/Background:** The American Joint Committee on Cancer currently includes the presence of extranodal tumor deposits, a poor prognostic indicator, in TNM

classification of colon cancer. However, it is unclear how tumor deposits compare to lymph node metastases. The objective of this study was to evaluate the survival impact of tumor deposits relative to lymph node metastases in stage III colon cancer.

**Methods/Interventions:** The US National Cancer Data Base (2004-2012) was reviewed for patients with resectable stage III adenocarcinoma of the colon, and stratified by presence of tumor deposits and lymph node metastases. Univariate and multivariate survival analyses were performed.

**Results/Outcome(s):** Of 6,424 patients evaluated, 10.1% had both tumor deposits and lymph node metastases (5-yr survival: 40.2%), 2.5% had tumor deposits alone (5YS: 68.1%), and 87.4% had lymph node metastases without tumor deposits (5YS: 55.4%). Patients with lymph node metastases alone tended to have a greater number of lymph nodes retrieved (20.9 vs. 18.8,  $p=0.0126$ ), and were more likely to receive adjuvant therapy (66.9% vs. 58.0%,  $p=0.003$ ) than those with only tumor deposits. Patients with both tumor deposits and lymph node metastases had significantly worse survival at all T stages of disease ( $p<0.05$ , all). There was no significant difference in survival between patients with only tumor deposits as compared to patients with only lymph node metastases at any T stage of disease ( $p>0.8$ , all). After controlling for patient, disease, and treatment characteristics, patients with tumor deposits alone (HR 0.56,  $p=0.001$ ), or only lymph node metastases (HR=0.64,  $p<0.001$ ) were associated with improved survival with respect to patients with both tumor deposits and lymph node metastases.

**Conclusions/Discussion:** The concomitant presence of both tumor deposits and lymph node invasion carries a poor prognostic significance. These patients should be closely monitored for recurrence and considered for more aggressive chemotherapeutic regimens. Tumor deposits alone appear to have similar prognostic implications as lymph node invasion alone.



## ROBOTIC RECTAL CANCER SURGERY IN ELDERLY PATIENTS: A WORD OF CAUTION.

P520

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**Purpose/Background:** Operative and oncological outcomes of robotic surgery for rectal cancer are currently under investigation. Risks and benefits of robotic surgery in elderly patients with rectal cancer are not well known. This study aimed to compare perioperative and short-term postoperative outcomes between elderly and non-elderly patients undergoing robotic radical surgery for rectal cancer.

**Methods/Interventions:** Between December-2014 and September 2016, patients who had robotic radical resection (with DaVinci Xi® System only) for rectal cancer with curative intent were reviewed. Patients with age of 65 years or older accepted as elderly based on the World Health Organization definition. Patients with extraperitoneal rectal tumor staged as cT3-T4 or any cN1 underwent neoadjuvant chemoradiation. Exclusion criteria were distant organ metastases, previous or concurrent cancer, past history of surgical or medical cancer treatment, simultaneous additional operations at the same session, patients who had robotic surgery with Si platform and children. Patient demographics, perioperative outcomes and short-term results were compared between the elderly and non-elderly patients.

**Results/Outcome(s):** There were 97 patients who fulfilled the study criteria. Gender [Female: 30 (47%) vs. 10 (30%),  $p=0.613$ ], ASA score [2 vs 2,  $p=0.176$ ], BMI ( $28\pm 4$  vs.  $27\pm 4$ ,  $p=0.461$ ), neoadjuvant chemoradiation [23 (36%) vs. 14(42%),  $p=0.533$ ] and history of prior abdominal operations [17 (27%) vs. 8 (24%),  $p=0.805$ ] were comparable between non-elderly and elderly patients respectively. Intraoperative complications were injuries of the urethra ( $n=2$ ), aorta ( $n=1$ ), bladder ( $n=1$ ), gonadal vein ( $n=1$ ) and left renal artery ( $n=1$ ). Conversion to open surgery [2 (3%) vs. 1 (3%),  $p=0.734$ ], operating time ( $310\pm 112$  vs.  $314\pm 130$  min,  $p=0.870$ ), estimated blood loss during surgery ( $104\pm 100$  vs.  $140\pm 120$  ml,  $p=0.176$ ), time to flatus ( $2\pm 1$  vs.  $2\pm 1$ , 0.331), time to bowel movement ( $3\pm 2$  vs.  $3\pm 1$ , 0.376) and length of hospital stay ( $6\pm 2$  vs.  $8\pm 5$ ,  $p=0.279$ ) were similar between the groups. Conversion to laparoscopy was not required in any operation. There was no incomplete total mesorectal excision in both groups. While the complications were comparable separately, overall complication rate was higher in the elderly group (Table).

**Conclusions/Discussion:** Radical surgery with robot is safe and feasible in elderly patients with rectal cancer. The decision to operate robotically should be carefully calibrated by considering increased risk of postoperative morbidity in elderly patients.

**A RANDOMISED CONTROL CLINICAL TRIAL TO ASSESS THE IMPACT OF ENHANCED GERIATRIC INPUT ON ELDERLY PATIENTS UNDERGOING COLORECTAL CANCER SURGERY.**

P521

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**Purpose/Background:** Elderly patients undergoing colorectal cancer surgery often experience higher rates of complications, mortality, readmission and longer length of stay. Enhanced input from Geriatrician has been shown to improve outcome and survival in Orthopaedic patients. This study aims to evaluate the impact of enhanced geriatric input on the elderly colorectal cancer patients undergoing curative treatment.

**Methods/Interventions:** Elderly patients (>70 yrs) with histologically proven colorectal cancer were randomised to either conventional surgical treatment or enhanced geriatric input. Admitting a two-sided type I error of 0.05 and an estimated power of 80%, 78 patients in total will be required.

**Results/Outcome(s):** Both groups were homogenous with respect to age, ASA, site of pathology and tumour stage. Minimally invasive surgery (laparoscopic or robotic) was performed on 89.5% of patients. The length of stay was statistically significantly shorter in the intervention group (8.5 +/- 6.4 days) when compared to control (14.5 +/- 14.0 days) (p<0.05). Postoperative complication was also significantly lower in the intervention group (7% vs 13%) (p<0.05).

**Conclusions/Discussion:** Enhanced geriatric input on elderly patients undergoing curative colorectal cancer surgery reduces complications and shorten hospital stay.

**PREHABILITATION PROGRAMS FOR COLORECTAL CANCER PATIENTS.**

P522

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**Purpose/Background:** Prehabilitation reflects a proactive process of preoperative optimisation undertaken between cancer diagnosis and definitive surgical treatment. The aim was to assess the attitudes towards prehabilitation and current practice amongst Australasian Colorectal Surgeons.

**Methods/Interventions:** An online questionnaire was distributed amongst the 207 members of the Colorectal Surgical Society of Australia and New Zealand. One reminder was sent two weeks following initial distribution.

**Results/Outcome(s):** 71 members (34%) participated in this survey, of which 76% indicated that they had a mixed public/private practice. The median work load of the respondents was 2-5 major colorectal resections per week. Currently, cancer prehabilitation program are utilised in 21% of represented institutions. Only 18% of respondents concurred that prehabilitation is supported by robust evidence, but 61% were agreeable to partake in research and 77% indicated that a prehabilitation program could be deliverable in their hospitals. The majority (80%) of preoperative assessments for elective colorectal cancer patients in represented institutions are performed by anaesthetists. Preoperative fitness assessment are performed in 30% of cases. Awareness of objective fitness assessment tools amongst the participants was low, suggesting that they are currently not integrated into clinical practice. All respondents routinely assess colorectal cancer patients for anaemia, 40% for iron deficiency, while 56% assess for iron deficiency only in anaemic

**P520 Patient characteristics and specific outcomes**

	non-elderly (n=64)	Elderly (n=33)	p value
Operations performed, n(%)			
Anterior & low anterior resections	61 (95)	29 (88)	0.224
Abdominoperineal resection	3 (5)	4 (12)	
Level of anastomosis, cm	8.4±7.6	10.2±7.03	0.397
Overall complication, n (%)	16 (49)	12 (19)	0.002
Pulmonary embolus, n (%)	2 (3)	1 (3)	>0.999
Wound infection, n (%)	2 (6)	3 (5)	>0.999
Abdominoplevic abscess	1 (2)	3 (9)	0.112
Renal failure	0	1 (3)	0.340
Anastomotic leak	1 (2)	3 (9)	0.112
Cardiac	0	1 (3)	0.340
Fistula	1 (2)	0	>0.999
Urinary retention	1 (2)	0	>0.999
Ileus	7 (11)	6 (18)	0.336



patients. 78% routinely assess patients for malnutrition, predominantly by using BMI (80%) and albumin (79%). Iron infusions were used to treat iron deficiency in 91% of represented institutions. Oral iron (51%) and blood transfusions (preoperative-34% and perioperative - 30%) were also routinely used. 75% of respondents rarely or never involved a haematologist. Of the respondents, 91% believe that physically fit patients suffer less complications than sedentary patients and 79% estimated moderate-to-high benefit of prehabilitation programs, particularly for cases requiring laparotomy or pelvic dissection. Three quarters (74%) of respondents were prepared to delay an elective colorectal resection by an additional 2-6 weeks in order to improve preoperative fitness. Statistical difference was not identified when respondents were stratified per volume of cases, or years in practice. Respondents believe that prehabilitation was of most beneficial to deconditioned patients (79%) and patients with an ASA of  $\geq 3$  (70%). The highest importance of individual factors within the prehabilitation bundle of care was placed on blood management (64%), nutritional optimisation (55%) and smoking and alcohol cessation (53%).

**Conclusions/Discussion:** The awareness of prehabilitation amongst colorectal surgeons is variable and current utilisation of such programs is low. Further work in this area may provide considerable benefit to patients undergoing colorectal cancer surgery.

#### HYALURONIC ACID FAMILY MEMBERS AS POTENTIAL PROGNOSTIC BIOMARKERS IN COLON AND RECTAL CANCER.

P523

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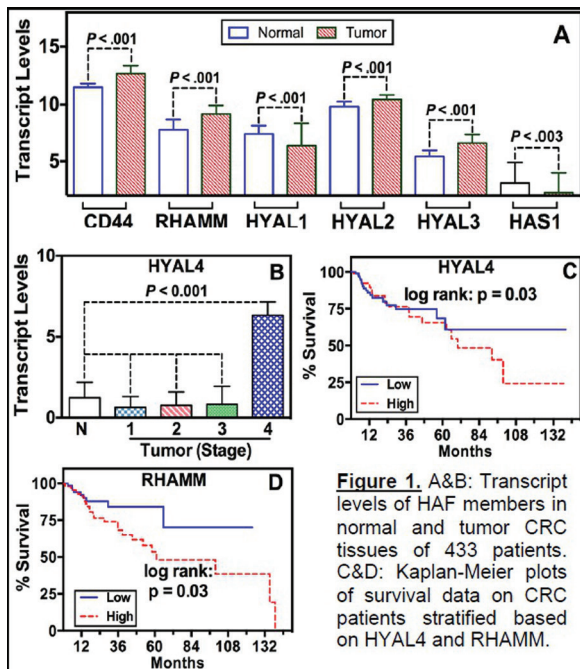
**Purpose/Background:** Hyaluronic Acid (HA) is a component of the extracellular matrix that regulates cell proliferation, differentiation, adhesion, and migration. HA is over-expressed in many malignancies, including colon and rectal cancer (CRC). HA is synthesized by HA-synthases (HAS-1, 2, 3) and signals through HA-receptors RHAMM and CD44 (CD44s, CD44v). HA degradation by HYAL1 hyaluronidase generates angiogenic HA fragments. These HA-family genes have been shown to promote tumor growth and metastasis. However, no studies have evaluated the prognostic potential of HA-family members in CRC.

**Methods/Interventions:** In a retrospective study, we examined the expression of nine HA family genes, (CD44, RHAMM, HAS-1, 2, 3, and HYAL-1, 2, 3, 4) in CRC specimens from 433 patients included The Cancer Genome Atlas (TCGA). To validate the TCGA data, we measured the expression of these HA-family transcripts by RT-quantitative PCR (qPCR) in matched normal colon

and CRC tissue specimens from 24 patients (White = 16, Black = 8; Female = 10, Male = 14; Stage 0: 2, Stage II: 7, Stage III: 9, Stage IV: 6) obtained from our institutional biorepository. Transcript levels were normalized to beta-actin mRNA levels. Deidentified clinical data was obtained to follow living patients for the development of recurrence or metastasis.

**Results/Outcome(s):** TCGA data with 433 patients showed that among the 9 HA-family members, CD44 and HYAL-4 mRNA levels of were elevated in CRC tissues when compared to normal tissues and the increase correlated with stage; with a 2-6-fold increase in Stage III and IV specimens ( $P < 0.001$ ). In CRC specimens, RHAMM and HYAL-4 levels correlated with patient survival. Kaplan-Meier plots showed high HYAL-4 and RHAMM levels significantly correlated with decreased survival in CRC patients, particularly those living longer than 3 years (log rank  $P = 0.03$ ). This association remained significant even when patients were matched for clinical stage. In our validation study utilizing qPCR, CD44v, RHAMM, HYAL-2, and HYAL-3 mRNA levels were elevated about 2-fold whereas HAS-2 levels decreased 1.7-fold ( $P < 0.05$ ) in CRC tissues when compared to matched-normal colon tissues ( $P < 0.01$ ); CD44s, HAS-1, HAS-3, and HYAL-1 levels remained unaltered. In CRC specimens demonstrating lymphatic invasion, HAS-1, HYAL-1, and HYAL-3 levels were elevated 3-4-fold ( $P < 0.05$ ) and CD44s was elevated 13-fold ( $P < 0.03$ ).

**Conclusions/Discussion:** This is the first study that demonstrates HA family members are differentially expressed in CRC tissues and their expression correlates with poor clinical outcomes. Elevated HAS-1, HYAL-1, and HYAL-3 levels were associated with lymphatic invasion. While elevated RHAMM and CD44 may be markers associated with poor survival regardless of clinical stage.



**Figure 1.** A&B: Transcript levels of HAF members in normal and tumor CRC tissues of 433 patients. C&D: Kaplan-Meier plots of survival data on CRC patients stratified based on HYAL4 and RHAMM.

## SURGICAL VOLUME OF COLORECTAL CANCER RELATE TO QUALITY OF IN-PATIENT HEALTHCARE: EXPERIENCE OF CHINESE PROVINCE.

P524

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**Purpose/Background:** It has been proved that medical institutions with higher surgical-volume or patient-volume had better effective in outcomes of colorectal cancer treatment. Rare study started to focus on relation between experience of surgeons and treatment with colorectal cancer. However, past reports always included the surgeons based on less than 200 colorectal patients experience, and almost no studies from Asia. In China, subspecialists treated more colorectal cancer patients, as parts of whom about 100 operations per year. Therefore, we studied quality of colorectal cancer healthcare from database of 81 billion-population province.

**Methods/Interventions:** Our study designed to investigate 8 main medical institutions allocated in Sichuan Province, China, included 16 surgeons in colorectal surgery subspecialists and 30 in general surgery. We divided the groups based on volumes of colorectal operations, average 50 operations or less per year in A group had 11 surgeons, 51-100 ops in B group had 26 surgeons, 101-300 in C group had 7 surgeons, more than 300 ops per year in D groups had 2 surgeons.

**Results/Outcome(s):** 26988 colorectal cancer patients were included in this study with surgery, colon cancer vs rectal cancer was 47%:53%. Higher volumes of groups had higher ratio of rectal cancer patients (<0.05). We definite

the types of rectal cancer, as HAR, LAR/ULAR, extremely location of anus-saving in ISR(e-ISR). Performing e-ISRs were more ratio in D group (<0.05), and also surgeons in this group preferred to use less prevention temporary stomas (<0.05) in anterior resections. The average age of patients were not in different (>0.05), but the distribution of age in D group was wider than others(<0.05). In the ratio of TNM staging, there was no different in four groups (>0.05). Post-operative in-hospital days were shorter in D group (<0.05), which always treated with ERAS way, as 4 days in average. We investigated main complications as anastomosis leakage, anastomosis bleeding, SSI and so on. Total complication rate was not different in B-D groups but lower than A group (<0.05). Anastomosis leakage was appeared least in D group about 0.2% in past 6 years. Finally, we collected the cost of in-hospital totally, finding out C and D group had lower cost (¥45020±2038) than A and B groups (¥76206±10286).

**Conclusions/Discussion:** In traditional healthcare system from China, patients are concentrated into huge public hospitals, especially some specific diseases, which promotes parts of surgeons afford higher volumes of operations. Our study proved surgeons with high-volume operations could get more experience, in order to get greater treatment quality, less risks in recovery and less cost. This will be good suggestion for future healthcare reform in China.

## A RANDOMIZED CONTROLLED TRIAL ASSESSING QUALITY OF LIFE FOLLOWING LAPAROSCOPIC-ASSISTED VERSUS OPEN COLECTOMY FOR COLON CANCER.

P525

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**Purpose/Background:** Laparoscopic colonic resections (LCR) have been reported to lead to improved quality of life (QoL) as well as reduced blood loss, pain, complication rates, and hospital stays. Previously the ALCCaS study was performed in Australia and New Zealand and has been reported elsewhere. This study reported on operations from 33 surgeons in 31 hospitals. The outcomes previously reported were complication and reoperative rates, perioperative mortality, return of gastrointestinal function, and length of hospital stay. This trial also utilised a QoL measure; this paper reports on the QoL outcomes over the first two months postoperatively. It is hypothesised that those who have LCR will have better QoL for the two months post surgery relative to those who have an open colonic resection (OCR).

**Methods/Interventions: Trial Design** Between January 1998 and April 2005, we undertook a multicenter, prospective, randomized parallel-group trial comparing laparoscopic-assisted and conventional open colectomy

in patients with colon cancer at centers within Australia and New Zealand. **Participants** Patients with a single adenocarcinoma of the right, left, or sigmoid colon, presenting for elective treatment, were eligible for randomization. **Interventions** LCR or OCR. **Outcomes** Patient symptoms and QoL were measured using the Symptoms Distress Scale (SDS), the QoL Index (QLI), and the Global QoL Score (GQoLS) preoperatively, two days post-operatively, two weeks post-operatively, and two months post-operatively. **Statistical Methods** Repeated measures analyses were used. Per protocol analyses were performed comparing those who received LCR to those who received OCR (assigned initially or converted from LCR). Intention-to-treat (ITT) analyses were also performed comparing LCR to OCR.

**Results/Outcome(s): Participant Flow** Six hundred and one participants were recruited of whom 399 completed the QLI (66.4%). **Quality of Life over first 2 months post-operatively** In per-protocol analyses, those who received LCR had better QoL postoperatively in terms of SDS ( $p < 0.01$ ), QLI ( $p < 0.01$ ), and GQoLS ( $p < 0.01$ ) than those who received OCR at allocation or were converted to OCR. In ITT analyses, those assigned to LCR had better QoL postoperatively in terms of SDS ( $p < 0.01$ ) and QLI ( $p < 0.01$ ) while GQoLS did not quite reach significance ( $p = 0.056$ ).

**Conclusions/Discussion:** There appears to be short term QoL gains for those who receive LCR relative to OCR including when those who are converted to OCR are considered LCR in ITT analyses. Those who start as an LCR and convert to an OCR have the most impaired perioperative quality of life.

#### COMPOSITE PATHOLOGIC OUTCOMES IN TRANSANAL TOTAL MESORECTAL EXCISION FOR RECTAL CANCER.

P526

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**Purpose/Background:** The importance of achieving a good quality total mesorectal excision (TME) underlies current advancements in surgical techniques for rectal excision. However, recent multi-center trials of laparoscopic TME for low rectal cancers (ALaCaRT and ACOSOG Z6051) demonstrate suboptimal pathologic outcomes compared to the open approach. Trans-anal TME (TATME) may improve surgical visualization and facilitate dissection, but composite pathologic outcomes have not been reported. The objective of this study was to compare pathologic outcomes post TATME with a similar cohort of patients from the ACOSOG Z6051 trial. Our secondary objectives were to examine the frequency of operative and perioperative complications.

**Methods/Interventions:** A retrospective review was performed at a single high-volume institution including consecutive patients with clinical stage I to IV rectal cancer within 12 cm from the anal verge, treated with TATME from August 2015 to November 2016. Pathologic outcomes, operative and peri-operative complications were recorded. Based on the definition used in the ACOSOG Z6051 trial, resection was considered "successful" if: (1) TME was complete or near complete, (2) radial margin was  $>1\text{mm}$  and (3) distal margin was  $>1\text{mm}$ . Outcomes were compared to the laparoscopic and open TME cohort from the ACOSOG Z6051 trial. Discrete variables were compared using the Pearson chi square test.

**Results/Outcome(s):** Forty patients met inclusion criteria and were included in the study. The mean age was 58.1 years, 29 were male (72.5%), and the mean BMI was 27.1. Neoadjuvant chemoradiation was administered to 29 patients (72.5%). 36 patients (90%) had a low anterior resection with ileostomy diversion and 4 patients (10%) had an abdominoperineal resection. There were no cases that were converted to open. Pathologic stage 0 (complete pathologic response), I, II, III and IV was encountered in 6 (15%), 12 (30%), 7 (17.5%), 12 (30%), and 3 (7.5%) patients, respectively. Successful pathologic resection was obtained in 95% of patients in our cohort compared to 81.7% in the laparoscopic ( $p=0.036$ ) and 86.9% in the open ( $p=0.15$ ) ACOSOG Z6051 cohorts. Severe complication was encountered in 1 patient (2.5%) who required a second operation. The mean length of stay was 4.15 days and 5 patients (12.5%) were re-admitted to hospital within 30 days.

**Conclusions/Discussion:** The TATME approach for the treatment of low rectal cancers is safe and in our experience yields composite pathologic outcomes that are comparable to open and superior to previously reported laparoscopic TME. Future prospective comparative studies are warranted.

#### MUCINOUS CYSTADENOMA OF THE APPENDIX CAUSING COLONIC INTUSSUSCEPTION: A CASE STUDY AND REVIEW OF THE LITERATURE.

P527

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**Purpose/Background:** The clinical manifestations of mucocele and intussusception are nonspecific which make a diagnosis difficult to establish and may cause a delay in treatment. We report a case of a 34 year old female who presented 3 days after normal spontaneous vaginal delivery with abdominal pain due to intussusception from a mucinous cystadenoma of the appendix. An open laparotomy was performed revealing intussusception of the ileal segment to the distal transverse colon causing proximal

obstruction. A right colectomy was conducted. The pathologic examination showed intussusception caused by a low grade cystadenoma of the appendix. Patient has 2 year follow up with no evidence of recurrence. The review of literature for the past 20 years for intussusception caused by appendiceal mucocele was reviewed.

**Methods/Interventions:** The literature on intussusception of the appendix secondary to mucinous cystadenoma is limited to case reports due to the rarity of the condition. A PubMed search using the following key word combinations was performed: “mucocele, appendix and intussusception,” “cystadenoma and intussusception,” and “cystadenocarcinoma and intussusception.” The search resulted in 24 articles in the English language from 1996-2016. Each article was reviewed and 25 patients were studied (including patient presented) for age, sex, presentation, diagnostic imaging, CEA level, endoscopic findings, treatment, and pathology.

**Results/Outcome(s):** Intussusception caused by mucocele is found in adults with median age 41 (age range 21-84) and more common in females (67%). The most common presentation was abdominal pain (92%) with 3 patients (12%) having a history of diarrhea. CT scan was the most common imaging test used to diagnose intussusception. Five patients had a preoperative colonoscopy with two of the patients having a submucosal lesion and a “cushion sign” when probed. Three patients had a preoperative CEA level and two patients had an elevation in CEA (14 and 24 ng/mL). Intussusception was able to be reduced in 2 patients prior to resection. 24 of the 25 patients had a right colectomy (96%) performed. One patient had the intussusception reduced with colonoscopy and a subsequent appendectomy. All pathology showed low grade mucinous cystadenoma of the appendix. There were no deaths or complications reported.

**Conclusions/Discussion:** Intussusception secondary to an appendiceal mucocele is a rare disorder with 24 cases reported in the English literature for the past 20 years. CT scan is the most common diagnostic test for preoperative planning of the resection. On colonoscopy the findings may be confused with a lipoma due to a positive “cushion sign.” Appendiceal mucocele is a benign process if removed intact; therefore, in the setting of intussusception, treatment should be to remove the specimen without spillage of mucus. Surgical treatment with a right colectomy is the treatment of choice for these lesions.



Axial CT scan of the abdomen demonstrating the “target-like” lesion corresponding to the intussuscepted mucocele to distal colon

### ELECTIVE COLON RESECTION WITHOUT CURATIVE INTENT IN STAGE IV COLON CANCER.

P528

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**Purpose/Background:** Evidence suggests that primary colon resection (PCR) in patients with asymptomatic colon tumors and unresectable metastases is not required and may expose patients to unnecessary risk. We used SEER-Medicare to evaluate elective PCR in colon cancer patients with synchronous hepatic metastases.

**Methods/Interventions:** We used SEER-Medicare data to identify Stage IV colon cancer patients with hepatic metastases between 2000 and 2011. Patients who had liver guided therapy (resection, ablation) or had urgent/emergent colectomies were excluded. We compared patients who received chemotherapy only to patients who had elective PCR +/- chemotherapy. Univariate and multivariate analysis were used to identify predictors of PCR. Multivariate Cox regression was used to compare survival.

**Results/Outcome(s):** There were 5,139 colon patients with synchronous hepatic metastases who were treated with chemotherapy only or PCR +/- chemotherapy. The PCR rate decreased steadily over time. In 2000, 84% of patients underwent PCR, compared to 52% in 2011 ( $p < 0.001$ ). In multivariate analysis, older patients were more likely to undergo PCR (Table 1). Socioeconomic factors were also related to receipt of PCR. Patients from rural areas were significantly more likely to undergo PCR (OR 1.65,  $p < 0.001$ ) than patients from large, metropolitan areas. Similarly, the odds of patients from high poverty areas (>10%) undergoing PCR were almost 25% higher than those of patients from low poverty areas (OR 1.23,  $p = 0.03$ ). African American patients were less likely to undergo PCR than white patients (OR 0.76,  $p = 0.01$ ). In multivariate survival analysis, PCR was associated with a statistically significant survival benefit (HR 0.59,  $p < 0.001$ ). The clinical significance is less apparent, however, as the

median survival in the chemo-only group was 9 months compared to 11 months in the PCR cohort.

**Conclusions/Discussion:** Elective PCR in the setting of unresectable metastases is not recommended. Although the rate has decreased significantly, over 50% of patients with untreated hepatic metastases underwent elective PCR in 2011. There was significant variation in use of PCR. More patients in poor and rural areas received elective PCR. This is likely multifactorial, but may underscore a lack of recognition by providers in these areas of the current recommendations against elective PCR. Interestingly, older patients in our data were also more likely to receive elective PCR. The exact reason for this is unclear; perhaps providers felt elderly patients were not good chemotherapy candidates (only 36% of the 85+ year olds received chemo), so they offered elective PCR to avoid possible complications of primary tumor growth. Although PCR appears to confer a survival benefit, this result should be viewed with caution. The clinical benefit is small. Additionally, residual confounding might bias these results in favor of patients undergoing surgery.

## PREOPERATIVE PERIPHERAL MONOCYTE COUNT IS A PREDICTOR OF RECURRENCE AFTER RADICAL RESECTION IN PATIENTS WITH STAGE II/III COLORECTAL CANCER.

P529

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**Purpose/Background:** Colorectal cancer is common worldwide. Although radical resection of the primary tumor is the optimal treatment for patients without metastases, some patients relapse after this procedure. Therefore, surveillance for recurrence and identifying patients at high risk of recurrence is important. Basic research has shown that myeloid cells are closely related to cancer progression. The aim of this retrospective study was to investigate whether pre-operative monocyte count is a biomarker of high risk of recurrence in patients who have undergone radical resection of colorectal cancer.

**Methods/Interventions:** Clinical data on 228 patients who had undergone surgery for colorectal cancer from May 2008 to July 2014 at the department of Gastroenterological Surgery 1, Hokkaido University Hospital, were

**P528 Demographics of Primary Colon Resection (PCR) with Stage IV Colon Cancer with Hepatic Metastases**

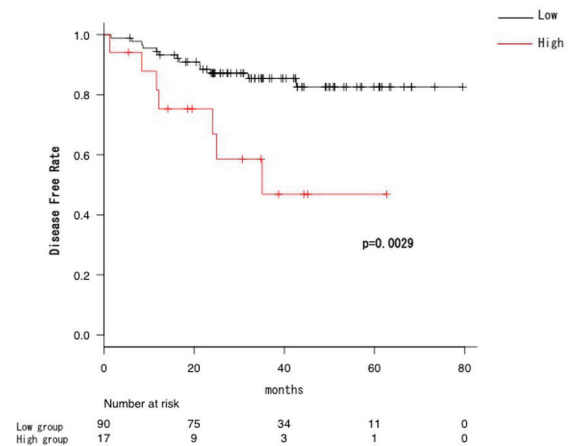
		Univariate		P value	Multivariate		
		No PCR N (%)	PCR N (%)		Odds Ratio	95% CI	P value
Age	66-70	415 (32.6)	857 (67.4)	<0.001		Reference	
	71-75	417 (31.1)	925 (68.9)	<0.001	1.07	0.91, 1.27	0.41
	76-80	330 (26.9)	898 (73.1)	<0.001	1.35	1.13, 1.61	0.001
	81-85	205 (24.1)	645 (75.9)	<0.001	1.62	1.32, 1.99	<0.001
	86+	87 (19.5)	360 (80.5)	<0.001	2.20	1.68, 2.89	<0.001
Gender	Male	716 (29.3)	1730 (70.3)	0.14		Reference	
	Female	738 (27.4)	1955 (72.6)	0.14	1.07	0.94, 1.22	0.29
Charlson	0	906 (27.5)	2390 (72.5)	0.19		Reference	
	1	332 (29.2)	805 (70.8)	0.19	0.97	0.83, 1.13	0.69
	2+	216 (30.6)	490 (69.4)	0.19	0.93	0.77, 1.12	0.46
Location	Metro (>1 million)	832 (30.6)	1889 (69.4)	<0.001		Reference	
	Metro (<1 million)	437 (28.7)	1088 (71.3)	<0.001	1.07	0.93, 1.24	0.33
	Non-Metro	185 (20.7)	708 (79.3)	<0.001	1.65	1.35, 2.01	<0.001
Race	White	1177 (27.4)	3115 (72.6)	0.005		Reference	
	African-American	183 (33.8)	359 (66.2)	0.005	0.76	0.62, 0.94	0.01
	Other	94 (30.8)	211 (69.2)	0.005	0.97	0.74, 1.26	0.75
Poverty	<5%	419 (30.2)	968 (69.8)	0.18		Reference	
	5- <10%	394 (27.6)	1031 (72.4)	0.18	1.18	0.99, 1.39	0.06
	>= 10%	641 (27.5)	1686 (72.5)	0.18	1.23	1.03, 1.47	0.03
Year	2000-2002	254 (16.7)	1268 (83.3)	<0.001		Reference	
	2003-2005	347 (24.6)	1063 (75.4)	<0.001	0.60	0.50, 0.73	<0.001
	2006-2008	416 (34.4)	795 (65.6)	<0.001	0.37	0.31, 0.44	<0.001
	2009-2011	437 (43.9)	559 (56.1)	<0.001	0.24	0.20, 0.29	<0.001

retrospectively collected. Stage II/III colorectal cancer had been diagnosed by pathologic examination of resected specimens in 107 patients who had undergone radical resection. Their median follow up was 32.7 months (range: 1.3–79.6 months). They were divided into two groups according to monocyte count, the cut-off value (489.1/ $\mu\text{L}$ ) for high versus low having been determined by ROC curve and the Youden index. Relationships between clinicopathological characteristics, including pre-operative monocyte count, and recurrence were analyzed by Fisher's exact test and multivariate logistic regression and between clinicopathological characteristics and relapse-free survival by Kaplan–Meier log-rank survival analysis and Cox proportional hazards regression analysis.  $P < 0.05$  was considered to denote statistical significance.

**Results/Outcome(s):** Rectal cancer ( $p=0.012$ ), T4 ( $p=0.046$ ), and high pre-operative peripheral monocyte count ( $p=0.012$ ) were all significantly associated with recurrence according to univariate analysis and independent predictors of recurrence according to multivariate analysis. Kaplan–Meier log-rank survival analysis showed that pre-operative high peripheral monocyte counts (hazard ratio: 3.65, 95% CI: 1.09–12.20,  $p=0.036$ ), T4 (hazard ratio: 3.46, 95% CI: 1.12–17.80,  $p=0.034$ ) and rectal cancer (hazard ratio: 3.40, 95% CI: 1.15–10.0,  $p=0.027$ ) were associated with disease-free survival. The 2-year and mean disease-free survival rates in the high monocyte group were 75.3% and 43.6 months, respectively, whereas they were 87.2% and 63.5 months, respectively, in the low monocyte count group.

**Conclusions/Discussion:** We found that preoperative monocyte counts may be biomarkers for high risk of recurrence in patients with Stage II/III colorectal cancer. Such patients should be followed up carefully and actively considered for postoperative chemotherapy.

**Figure**



#### ANAL CANAL SQUAMOUS-CELL CARCINOMA. ONCOLOGICAL RESULTS OF A CHILEAN SINGLE REFERRAL CENTRE.

P530

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**Purpose/Background:** The standard of care for most squamous-cell carcinoma of the anal canal (SCC) should be combined modality chemoradiotherapy (CRT) following Nigro's protocol, which permits organ preservation and better local control than surgery. Long-term oncological results experienced in patients with anal canal SCC who were treated at our center are presented.

**Methods/Interventions:** A retrospective review of medical records of all patients referred to our center with a histological diagnosis of invasive anal canal SCC from 2001 to 2011 were included in the analysis. All patients were initially treated with CRT. Salvage abdominoperineal resection (APR) was indicated in patients after failed CRT. Patients treated with local excision were excluded.

**Results/Outcome(s):** Median follow-up of the cohort was 40 months, with a minimum follow-up of at least 23 months. A total of 29 patients were included in the analysis, 66% women, with a median age of 62 years, with comorbidities in 75% of the group, highlighting among them 5 patients (17%) with HIV infection. Complete clinical response to CRT at 6 months-period was 82%. 9 (31%) patients underwent salvage APR, 5 patients were classified as having persistent disease, whereas 4 patients were classified as having recurrent disease. An overall survival of 72% was found in our series. 3-year colostomy-free survival

was 75%. 5-year survival was 80% in patients who were treated with CRT alone and, 5-year-survival for patients who underwent salvage APR was 58%. 5-year survival of HIV positive patients was 60%.

**Conclusions/Discussion:** Our results represent a large, single referral center group of patients undergoing treatment for anal canal SCC. CRT was the primary treatment in all cases showing acceptable results in terms of overall survival and colostomy-free survival, comparable to published literature. On the other hand, oncological results achieved in patients who underwent salvage APR, after failed CRT, are markedly compromised compared to CRT alone group.

#### THE APPLICATION OF INCISIONAL NEGATIVE PRESSURE WOUND THERAPY FOR PERINEAL WOUNDS: A SYSTEMATIC REVIEW.

P531

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**Purpose/Background:** Impaired perineal wound healing is a major source of morbidity after abdominoperineal resection. Incisional negative pressure wound therapy is the application of negative pressure wound therapy on closed incisions. It is a way to improve healing, prevent surgical site infections, and decrease the frequency of dehiscence. Its use on perineal wounds is not well established. The primary objective of this systematic review was to summarize existing evidence on the use of incisional negative pressure wound therapy on perineal wounds after abdominoperineal resection.

**Methods/Interventions:** In December 2015, the electronic databases of Ovid Medline, EMBASE, Cochrane Library, and CINAHL were systematically searched. Studies describing use of incisional negative pressure wound therapy on primarily closed perineal wounds after abdominoperineal resection were included.

**Results/Outcome(s):** The primary end point was presence/absence of literature on the subject of incisional negative pressure wound therapy for perineal wounds. Secondary outcome measures were the effect of incisional negative pressure wound therapy on post-operative perineal wound complication incidence. Of the 371 identified studies, three articles were retrieved for inclusion in the systematic review (n=162 patients). There were two retrospective consecutive cohorts and one prospective consecutive cohort. All studies demonstrated a significant decrease in perineal wound complications when using incisional negative pressure wound therapy, with surgical site infection rates as low as 9% (vs. 41% in control groups).

**Conclusions/Discussion:** Incisional negative pressure wound therapy appears to decrease perineal wound complications after abdominoperineal resection when placed on

the wound prophylactically for 5 post-operative days at 125mm Hg. Limitations of this review include the small number of retrieved studies with small, heterogeneous patient populations. Further prospective trials with larger patient populations would be needed to confirm this association as well as delineate which patients might benefit most from the intervention.

#### RECTAL CANCER SURVEILLANCE STUDY: ARE WE FOLLOWING UP CLOSE ENOUGH?

P532

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**Purpose/Background:** Surveillance for rectal cancer after surgical resection remained a debatable issue. Differing opinions exist due to cost-benefit issue. We evaluated the pattern of recurrences and modality to detect it.

**Methods/Interventions:** An analysis was performed on a retrospective database of 326 patients with rectal cancer who underwent curative surgical resection from 1999 to 2007. The above study duration was chosen as it ensured that all patients included in the study had at least 10 years of follow up. Data on patient demographics, peri-operative details and follow up outcomes were extracted from the database. The pattern of recurrence and investigative modality that detected recurrences was identified. Patients were followed up until either year 2016 or the day of their demise.

**Results/Outcome(s):** 217 patients (66.6%) are male and 109 patients (33.3) are female. Median age of the patients was 64 years old. Close to a third of the patients received adjuvant therapy (34%). Among the 326 patients studied, 29.8% (97/226) patients had recurrence within the follow up duration. 2.5% (8/97) had local recurrence, 5.2% (17/97) had regional recurrence and 22.0% (72/97) had distant metastasis. CT abdomen pelvis remained the best modality to pick up recurrences in all subgroups. (50.0% in local, 47.1% in regional and 41.7% in distant metastasis). Most common site of recurrence for distant metastasis is the lung (34.7%) with single site distant metastasis being the most common (66.7%) as well. Unfortunately, the rate for salvageable recurrences is low (25.0% in local, 52.9% in regional and none in distant metastasis).

**Conclusions/Discussion:** Recurrence for rectal cancer after surgical resection remains major issue for most surgeons. The predominant pattern of recurrence in rectal cancer is distant disease. Surveillance protocols need to be optimized to target detection of distal recurrences at a state amenable to metastectomy.

**LOCALLY-ADVANCED RECTAL CANCERS IN PATIENTS OF AFRICAN-AMERICAN ETHNICITY ARE ASSOCIATED WITH DELAYS IN NEOADJUVANT CHEMORADIOTHERAPY AND DECREASED SURVIVAL.**

P533

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**Purpose/Background:** The proper management of stage II and III rectal cancers presents challenges in coordinating care among several disciplines. For minorities, health care access barriers may exacerbate the challenges of timely multidisciplinary care. This study sought to evaluate whether minority groups experienced delays in the initiation of neoadjuvant chemoradiotherapy (nCRT) and whether such delays were associated with lower overall survival.

**Methods/Interventions:** The National Cancer Data Base was used to identify patients between 40 and 75 years of age who were diagnosed with clinical stage II and III rectal cancers from 2004-2012. Patients were excluded if they did not receive nCRT followed by surgical resection with curative intent. A multivariable survival model with a Weibull distribution was used to assess overall survival as well as the time point at which a delay in the administration of nCRT negatively impacted overall survival, while controlling for age, race/ethnicity, sex, insurance status, socioeconomic status based on income, Charlson Comorbidity Score and hospital designation. Odds ratios with 95% confidence intervals for characteristics associated with delays in initiating nCRT were calculated using multivariable logistic regression.

**Results/Outcome(s):** Of 21,321 patients in the study population, 1,685 (7.9%) were of black ethnicity and 2,580 (12.1%) were of Hispanic descent. There was no significant difference in the distribution of cancer stages stratified by ethnicity ( $P > 0.05$ ). Overall survival was worse when the interval between diagnosis and nCRT was greater than 8 weeks (hazard ratio of death [HR]=1.1, 95% confidence interval [CI]=1.01 to 1.2,  $P = 0.02$ ), while shorter delays in initiating nCRT did not influence survival. When compared to those of white race, being of black ethnicity was associated with lower overall survival (HR=1.18, 95% CI=1.06 to 1.31,  $P = 0.002$ ) while those of Hispanic ethnicity had a similar survival to whites (HR=0.93, 95% CI=0.85 to 1.01,  $P = 0.09$ ). On logistic regression, black ethnicity was independently associated with more than twice the odds of a delay of greater than 8 weeks in beginning nCRT after cancer diagnosis, when compared to whites (OR=2.01, 95% CI=1.76 to 2.3,  $P = < 0.001$ ); this trend was observed, but to a lesser extent, among those of Hispanic ethnicity compared to whites (OR=1.45, 95% CI=1.29 to 1.64,  $P = < 0.001$ ).

**Conclusions/Discussion:** Rectal cancer patients of black ethnicity are more likely to experience delays in

receiving nCRT, with a corresponding lower overall survival, highlighting the continued need for improvements within this population. Further investigation into whether black patients also have a different cancer biology affecting their survival rates is needed, given that Hispanic patients experienced more frequent delays in nCRT compared to white patients, though with similar survival to white patients.

**ONCOLOGIC OUTCOMES ASSOCIATED WITH A SELECTIVE APPROACH TO NEOADJUVANT RADIATION THERAPY IN PATIENTS WITH CT3N0 RECTAL CANCER: RESULTS FROM A RETROSPECTIVE COHORT STUDY.**

P534

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R. Gregoire, A. Bouchard, S. Drolet  
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**Purpose/Background:** Utilization of neoadjuvant radiation therapy (RT) in cT3N0 rectal cancers remains controversial in the literature. RT is associated with a reduction in the risk of local recurrence without significant improvement in overall survival. On the other hand, RT is associated with greater risks of bowel and sexual dysfunction. Our goal was to investigate the oncological outcomes of patients with cT3N0 rectal cancer treated with selective use of neoadjuvant RT followed by TME surgery.

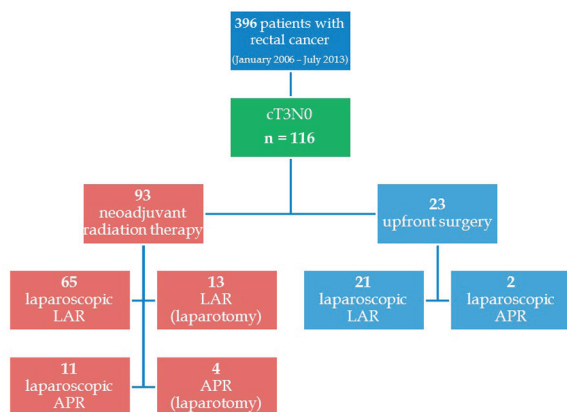
**Methods/Interventions:** All patients with a clinical stage T3N0 rectal adenocarcinoma treated with surgery in our center between January 2006 and July 2013 were included. Standardized chart review was performed to collect demographic, perioperative and oncologic data. Patients were stratified in two groups according to the use of neoadjuvant RT or its omission. Primary outcomes were local recurrence, overall survival and disease free survival. Secondary outcomes included positive circumferential resection margin. Statistical analyses were realized with SAS software.

**Results/Outcome(s):** A total of 116 patients were identified. 93 patients received neoadjuvant long course chemoradiation while 23 underwent upfront surgery. Patients in which RT was omitted were significantly older (75.0 VS 62.4 y;  $p < 0,001$ ) compared to patient having neoadjuvant chemoradiation. Median follow-up was shorter in the group without RT (28.5 VS 41.1 months;  $p = 0.0083$ ). Local recurrence was not statistically different in both groups (4.3 VS 6.5%;  $p = 1$ ). There was no statistically significant differences in 5-years overall survival (49.3 VS 73.9%;  $p = 0.17$ ) and 3-years disease free survival (78.35 VS 80.97%;  $p = 0.83$ ). Bivariate analysis revealed that RT omission was not a contributing factor in the development of disease recurrence. Also, RT omission was not associated with a higher rate of positive circumferential resection margin in our cohort (0 VS 4%;  $p = 0.5832$ ).



**Conclusions/Discussion:** This study demonstrates that omitting RT for selected patients with cT3N0 rectal cancer tends to offer similar oncologic results. Further studies are required to clarify the appropriate tumor profile and patient characteristics for the omission of radiation therapy in rectal cancer.

## Flow Chart



### PERIOPERATIVE BLOOD TRANSFUSION FOR RESECTED COLON CANCER: PRACTICE PATTERNS AND OUTCOMES IN A SINGLE PAYER, PUBLICLY FUNDED, POPULATION-BASED STUDY.

P535

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**Purpose/Background:** Older literature suggests that peri-operative blood transfusion among patients with resected colon cancer may be associated with inferior long-term survival. Here we describe practice patterns and outcomes in a contemporary population-based cohort in the Canadian province of Ontario.

**Methods/Interventions:** All cases of surgically resected colon cancer in Ontario, Canada from 2002-2008 were identified using the population-based Ontario Cancer Registry. Linked records of treatment identified surgery and transfusion during admission. Pathology reports were obtained for a 25% random sample of all cases; these cases constitute the study population. Modified Poisson regression was used to identify factors associated with transfusion. Cox proportional hazards model explored the association between transfusion and cancer-specific (CSS) and overall survival (OS), after adjusting for important confounders including age, comorbidities, disease stage, high risk histologic features and adjuvant therapy.

**Results/Outcome(s):** We included 7249 patients with resected colon cancer. Twenty-eight percent of patients were transfused; rates decreased over the study period from 32% in 2002 to 24% in 2008 ( $p < 0.001$ ). Factors that were independently associated with transfusion include age

( $p < 0.001$ ), gender ( $p < 0.001$ ), comorbidity ( $p < 0.001$ ), stage ( $p < 0.001$ ) and open resection ( $p < 0.001$ ). Surgeon volume was not associated with transfusion rate. Transfused patients had a higher perioperative mortality (8% vs. 2%,  $P < 0.001$ ), lower 5 year OS (42% vs. 65%,  $P < 0.001$ ) and lower 5 year CSS (54% vs. 71%,  $P < 0.001$ ). In the Cox model we found transfusion was associated with inferior CSS (HR 1.55, 95%CI 1.42 - 1.69) and OS (HR 1.55, 95%CI 1.44 - 1.66). Stratified analysis found that overall survival was most negatively associated with transfusion in earlier stages: Stage I HR 1.79 (95%CI 1.42 - 2.26), Stage II HR 1.77 (95%CI 1.55 - 2.02), Stage III HR 1.45 (95%CI 1.30 - 1.60), Stage IV HR 1.10 (95%CI 0.88 - 1.38). Sensitivity analysis, excluding those who died within 90 days, was consistent with these results.

**Conclusions/Discussion:** Our study describes the practice patterns and outcomes in patients with resected colon cancer, in a single payer, publicly funded population. We found an association between RBC transfusion and worse overall and cancer specific survival, after adjusting for important confounders. The magnitude of effect was more pronounced in earlier stage colon cancers. This study confirms earlier reports of association between transfusion and worse survival in colon cancer patients. Our study is unique in that it is the first to use population level data during the modern age of treatment of colon cancer. Most previous studies were published prior to widespread adoption of standardized 5FU adjuvant chemotherapy regimens and prior to the introduction of minimally invasive surgery.

### PERCENTAGE OF THE PELVIC CAVITY OCCUPIED BY A RECTAL TUMOR AND RECTUM AFFECTS THE DIFFICULTY OF LAPAROSCOPIC RECTAL SURGERY.

P536

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**Purpose/Background:** Recognizing that the safety and efficacy of laparoscopic surgery for rectal cancers have not been fully established, we conducted a retrospective study to determine whether the percentage of the pelvic cavity occupied by a rectal tumor affects the difficulty of laparoscopic rectal surgery or the occurrence of postoperative complications.

**Methods/Interventions:** Our study involved 100 patients with rectosigmoid (Rs), upper rectal (Ra), or lower rectal (Rb) cancer treated by laparoscopic surgery at our hospital. Pelvic volume (PV), rectal volume (RV), tumor volume (TV), and respective percentages of the pelvic cavity they occupied were determined on the basis of preoperative computed tomography colonography (CTC) reconstruction images. We analyzed the relation between these percentages and the time to resection, blood loss volume, and number of staples used on the rectal stump

(as measures of surgical difficulty) and anastomotic leakage (as a postoperative complication).

**Results/Outcome(s):** Univariate analysis revealed significant differences in age ( $P = 0.009$ ), PV ( $P = 0.012$ ), TV ( $P = 0.042$ ), percentage of the pelvic cavity occupied by the tumor ( $P = 0.011$ ), and percentage of the pelvic cavity by the tumor and rectum together ( $P = 0.003$ ) in all patients who developed anastomotic leakage and those who did not. Significant differences were also found in PV ( $P = 0.029$ ) and in the percentage of the pelvic cavity occupied by the tumor and rectum together ( $P = 0.041$ ) between the Ra patients in whom anastomotic leakage occurred and those in whom it did not occur. The blood loss volume and number of staples used differed significantly between the high-percentage occupancy group and low-percentage occupancy group ( $P = 0.050$  and  $P = 0.001$ , respectively). Further, the number of staples used differed significantly between the high-percentage occupancy Ra group and low-percentage occupancy Ra group ( $P = 0.019$ ). The data point to increased surgical difficulty and to an increased risk of anastomotic leakage when the percentage of the pelvic cavity occupied by the tumor is high.

**Conclusions/Discussion:** The percentages of the pelvic cavity occupied by the tumor and rectum are factors that influence surgical difficulty and the occurrence of complications and should be taken into consideration during the planning stages to ensure safe laparoscopic rectal cancer surgery.

#### LEFT-SIDED DOMINANCE OF EARLY-ONSET COLORECTAL CANCERS: A RATIONALE FOR SCREENING FLEXIBLE SIGMOIDOSCOPY IN THE YOUNG.

P538

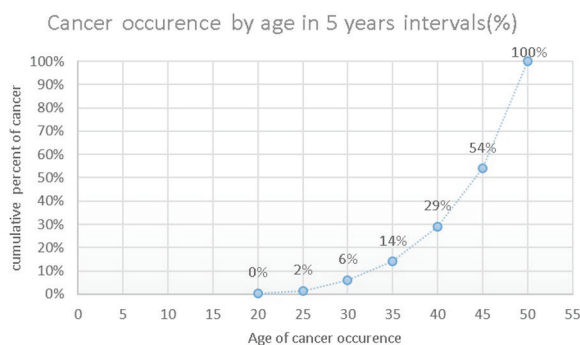
L. Segev, M. Kalady, J. Church  
Cleveland, OH

**Purpose/Background:** The recent alarming increase in the incidence of colorectal cancer in people younger than 50 years old needs to be addressed effectively and thoughtfully. With current recommendations to begin screening at age 50, these patients represent a missed opportunity. Previous studies from this Institution have shown that cancers of older age are associated with methylation of the colon wall which is more frequently located on the right side. Since methylation is an age-related phenomena we hypothesized that the anatomic distribution of colorectal cancers in the young will be mostly left sided. This would create an opportunity for screening the young by flexible sigmoidoscopy. The purpose of this study was to test our hypothesis by analyzing the anatomic distribution of sporadic colorectal cancers in patients under age of 50 in a large single institution cohort.

**Methods/Interventions:** We retrospectively reviewed all colorectal cancer cases under the age of 50 within our institution between the years 2000-2016. We excluded patients with a known hereditary syndrome by genotype or family phenotype, and with inflammatory bowel disease.

**Results/Outcome(s):** There were 842 patients with colorectal cancer diagnosed under age of 50. We excluded 103: 55 with inflammatory bowel disease, 24 with familial adenomatous polyposis, and 24 with Lynch syndrome. Of the remaining 739 patients, 45% were female. The age range at diagnosis was 18 to 49 years with a median age of 44. 530 patients were diagnosed between ages 40 and 49, 167 patients between ages 30 and 39, 40 patients between ages 20 and 29 and 2 patients under 20 years old (see figure). 231 patients (32%) had a family history of colorectal cancer. The anatomic distribution of the cancers was as follows: 485 rectum (65%), 107 sigmoid colon (15%), 19 descending colon (3%), and 128 (17%) from the splenic flexure to the cecum. Therefore 83% of the tumors were theoretically within range of flexible sigmoidoscopy. The same distribution was seen in patients with a colorectal cancer family history, and in all subgroups of age at diagnosis. Although our data may be distorted by referral patterns, similar results have been reported from population based studies.

**Conclusions/Discussion:** Given the combination of an increasing incidence of colorectal cancer in those under 50 years of age, and the significant predominance of a left sided cancer in these patients, we suggest that a screening flexible sigmoidoscopy starting at age 40 in average risk individuals is reasonable.



#### MAGNETIC RESONANCE (MR) PELVIMETRY FOR PREDICTING THE DIFFICULTY OF DOUBLE STAPLING TECHNIQUE IN TOTAL MESORECTAL EXCISION FOR RECTAL CANCER.

P539

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**Purpose/Background:** It is well known that laparoscopic total mesorectal excision (TME) is more challenging in deep narrow pelvis. Previous studies in the literature have

looked into the correlation of pelvic measurements and operating time. Very few have focused on one of the key step of the operation, i.e. performing the double stapling technique. The aim of this study is to ascertain whether MR pelvimetry can predict double stapling difficulty in TME for rectal cancers.

**Methods/Interventions:** A retrospective analysis of 96 patients who underwent total mesorectal excision for mid or low rectal cancers was performed. The number of cartridges used to transect the rectum at pelvic floor was retrieved from operative records and  $\geq 3$  was taken as the cut-off for increased difficulty. The MRIs were reviewed. Pelvic inlet, pelvic outlet, length of sacrum and angle 5 (inferioposterior pubis-superior anterior pubis-sacrovertebral angle) were measured from the sagittal view. The interspinous distance and intertuberos distance were measured from the axial view.

**Results/Outcome(s):** Pelvic inlet ( $p=0.004$ ), interspinous distance ( $p=0.009$ ) and intertuberos distance ( $p=0.005$ ) were found to be significantly associated with increased difficulty for double stapling technique in TME. The odds ratio of failure to transect distal rectum within two cartridges for pelvic inlet  $\leq 107$ mm, interspinous distance  $\leq 88$ mm and intertuberos distance  $\leq 97$ mm were 3.33 (95% CI 1.26-8.85), 2.70 (95% CI 1.03-7.07) and 2.81 (95% CI 1.07-7.38) respectively.

**Conclusions/Discussion:** MR pelvimetry could be used to predict difficulty of double stapling technique in TME. Alternative method, such as transanal TME could be considered in patients with unfavorable pelvic dimensions.

#### RANDOMISED CONTROLLED TRIAL OF COLONIC STENT INSERTION IN NON-CURABLE LARGE BOWEL OBSTRUCTION: A COST ANALYSIS LARGE BOWEL OBSTRUCTION: A COST ANALYSIS.

P540

A. Zahid, C. Young  
Sydney, NSW, Australia

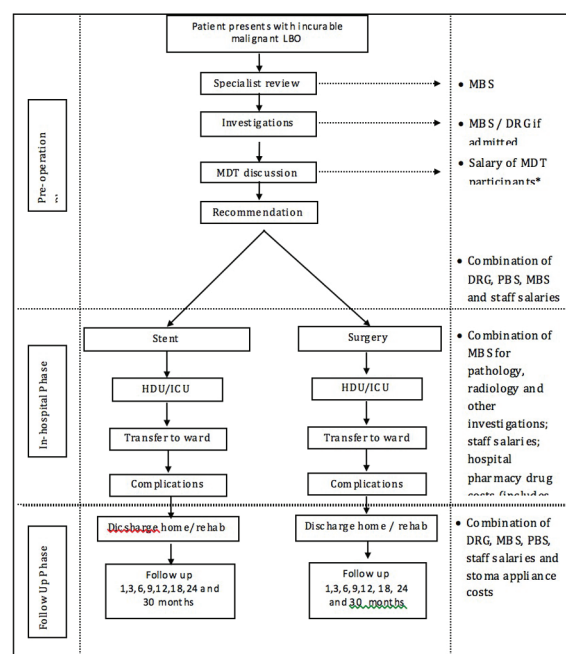
**Purpose/Background:** With the increasing burden on the health care system, this study aims to perform a cost-effectiveness analysis on the management of incurable large bowel obstruction.

**Methods/Interventions:** To analyse the cost of stent versus surgery in the treatment of non curable large bowel obstruction. A prospective randomised controlled trial with two major teaching hospitals in Australia. Patients who are diagnosed with incurable large bowel obstruction are enrolled. Patients were allocated to either colonic stenting or surgery groups. Data was collected at all points during the patient journey and QoL data was obtained by way of patient surveys. All data points were analysed and a cost-effectiveness study was performed to compare the costs between the two treatment groups.

**Results/Outcome(s):** Stenting as a procedure was significantly less expensive than surgery ( $p<0.001$ ). Ward stay for stented patients was significantly lower ( $p=0.012$ ). Combined costs of stent group ward stay, MDT discussion and complication management was also significantly lower ( $p=0.013$ ). The overall cost difference between the two treatment groups was \$AUD3,902.44, and was not significantly different ( $p=0.101$ ). The incremental cost-effectiveness ratio between the surgery and the stent group was \$19,512.20 in favour of stenting.

**Conclusions/Discussion:** Treatment with stenting is effective and cheaper than open surgery. With a favourable cost difference, stenting is safer, provides quicker discharge from hospital and has some QoL benefits.

Figure: Patient journey and derivation of costs. The right-hand column shows the source from which the costs were derived. Unit of cost was obtained from study database where available. MBS, medical benefits schedule; DRG, (Australian related) diagnosis-related group; MDT, multidisciplinary team; PBS, pharmaceutical benefits scheme;



#### SURGICAL AND SURVIVAL OUTCOMES OF LAPAROSCOPIC COLORECTAL RESECTION FOR CANCER IN OCTOGENARIANS AND NONAGENARIANS.

P541

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**Purpose/Background:** The study was designed to evaluate the outcomes and survival of octogenarians and older who had undergone elective laparoscopic colorectal resection for malignancy.

**Methods/Interventions:** From 2006-2013, 202 patients aged 80 years and older who underwent elective resection for colorectal cancer were included in the study. Excluded from the study were patients who had undergone

emergency operations, and those who previously had had more than one intraabdominal operation. Data was collected prospectively on the patients' demographics, operative details, pathology results, postoperative results and survival. Measured outcomes were operating time, blood loss, length of hospital stay, mortality and morbidities, disease recurrence and patient survival.

**Results/Outcome(s):** The study included 202 patients with the median age of 83 (range, 80-93) and 93 (46 percent) males. The median operating time was 120 minutes, with a median blood loss of 30 (range, 0-600) ml. Seven patients (4.5%) required conversion to open surgery. The overall mortality and morbidity rate were 2.5 and 24.8 percent respectively, with an anastomotic leakage rate of 3.8 percent. Median follow up period was 24 months (range, 0-96), 48 patients developed recurrence (25.1%). The five- year survival is 60 percent. Disease free five year survival rate is 37 percent.

**Conclusions/Discussion:** This study confirms laparoscopic resection for colorectal cancer is safe and beneficial to octogenarians and older. It has favourable short term and long term survival and oncological outcomes.

#### PROGNOSTIC IMPACT OF DISTRIBUTION OF LYMPH NODE METASTASIS IN PATIENTS WITH LOCALLY ADVANCED LOW RECTAL CANCER TREATED WITH PREOPERATIVE CHEMORADIOTHERAPY.

P542

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**Purpose/Background:** Although preoperative chemoradiotherapy (CRT) is a standard treatment for patients with locally advanced low rectal cancer, data on the prognostic significance of the distribution of lymph node metastasis are scarce. The aim of the present study was to examine the prognostic importance of the distribution of lymph node metastasis in patients with advanced low rectal cancer treated with preoperative CRT.

**Methods/Interventions:** We analyzed 369 patients with low rectal cancer without distant metastases treated with preoperative CRT or short-course RT from 2004 to 2014. Lateral lymph node dissection (LLND) was performed in patients with swollen lateral pelvic lymph nodes before CRT. Patients were classified as having LND1 (metastases in only perirectal lymph nodes), LND2 (metastases in intermediate lymph nodes without lateral pelvic lymph node metastasis), LND3 (metastases in lateral pelvic lymph nodes). Survival outcomes were compared among the groups.

**Results/Outcome(s):** Lymph node metastasis was found in 109 patients (29.5%), and these patients were included in the analysis. Seventy (63.0%) were male and 39 (37.0%)

were female patients. The median distance of the tumor from the anal verge was 40 mm (range, 10-80 mm). Lateral pelvic lymph node dissection was performed in 50 patients (45.9%). LND1, LND2, and LND3 were identified in 61 (60%), 12 (11%), and 36 (29%) patients, respectively. The 5-year relapse-free survival (RFS) of LND1, LND2, and LND3 patients were 51.5%, 15.0%, and 73.8%, respectively ( $P = 0.0112$ ). In LND3 patients, the 5-year RFS of patients with only lateral pelvic lymph node metastasis (87.1%,  $n = 16$ ) was significantly better than that with perirectal or intermediate lymph node metastasis (63.3%,  $n = 20$ ). According to the TNM stage, the 5-year RFS of patients with pN1a ( $n = 32$ ), pN1b ( $n = 43$ ), and pN2 ( $n = 34$ ) was 73.8%, 54.6%, and 41.7%, respectively ( $P = 0.1789$ ).

**Conclusions/Discussion:** The distribution of lymph node metastasis in patients with locally advanced low rectal cancer treated with preoperative chemoradiotherapy has significant prognostic impact on survival. The better survival outcome of patients with lateral pelvic lymph node metastasis compared with that of patients with perirectal or intermediate lymph node metastasis would justify lateral pelvic lymph node dissection in selected patients with suspected lateral pelvic lymph node metastasis even after preoperative CRT.

#### PELVIC FAT VOLUME REDUCTION WITH PREOPERATIVE VLED: IMPLICATIONS FOR RECTAL CANCER SURGERY IN THE OBESE.

P543

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**Purpose/Background:** Obese patients have higher complication rates when undergoing pelvic colorectal surgery: blood loss, operative duration, rates of anastomotic leak, incisional hernia and stomal complications are all increased. Indeed, laparoscopic rectal surgery may not be possible in the obese individual – in principle due to the bulk of the mesorectum, but also due to total pelvic fat (IPAT) and other visceral fat (VAT). Very low energy diets (VLED) reduce abdominal VAT but changes within the pelvis and mesorectum have not been documented. This article aims to objectively quantify the proportion of fat lost from the total intra-pelvic fat volume (IPAT) and mesorectal fat volume (MAT) in response to VLED. Secondly we aim to determine a clinically useful linear radiological measurement that correlates with volume that may be employed to predict the effect of pre-operative VLED.

**Methods/Interventions:** Patients scheduled for bariatric surgery with a standardised 4 week Optifast™ program (VLED) underwent one pre-VLED and one post-VLED

MRI of the pelvis. The VLED was supervised and compliance was measured. BMI, weight and girth measures were obtained prior to VLED and upon completion. All measures were performed prior to the intended bariatric procedure. Image acquisition was standardised. Adipose quantification analysis was performed using the Q-FAT software package developed with IDL. Statistical analysis was performed with SPSS (ver 23, IBM)

**Results/Outcome(s):** 9 patients were recruited, 5 female and 4 male. Median preoperative BMI was 55.8 with a median weight of 163Kg (25.7 stone). Median MAT reduction was 29.9%, range 11.6 - 66.6%. Median IPAT reduction was 19.7%, range 41.7% reduction to 8.9% increase. Individual results are shown in table 1. Linear regression showed correlation between the amount of mesorectal fat reduction and two variables: patient height and the distance from S1 to the posterior aspect of the rectum on MRI. The relationship predicted response to VLED ( $R^2$  67%,  $p$  0.035), whereas VLED compliance, BMI, gender and pre-VLED weight did not.

**Conclusions/Discussion:** VLED results in a clinically significant reduction in the volume of mesorectal fat with a lesser change in total intrapelvic fat, emphasizing the utility of VLED for pelvic surgery in the obese individual. The distance from S1 to the posterior rectum correlated well with MAT reduction, making this a valuable clinical tool when volumetric analysis is not possible.

## INCIDENTAL DETECTION OF COLORECTAL LESIONS BY FDG PET/CT SCANS IN MELANOMA PATIENTS.

P544

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**Purpose/Background:** The increased use of PET/CT scans in oncology patients has increased the detection of incidental colorectal lesions. The frequency and diagnostic outcomes of identifying these lesions in melanoma patients has not been previously studied. The primary objective of this study was to determine the incidence of incidental colorectal lesions found on PET/CT scans in melanoma patients. The secondary objectives were to correlate the radiological findings with their corresponding benign, premalignant and malignant lesions, identify which patients were referred for colonoscopy and what factors influenced referral for colonoscopy.

**Methods/Interventions:** A retrospective analysis of patients identified from the prospectively collected research database of Melanoma Institute Australia. 2,509 patients with melanoma underwent PET/CT scans were identified between 2001 and 2013. The incidence of incidental colorectal lesions, the correlation of imaging findings with the presence of benign, premalignant or malignant lesions, and the survival of patients who underwent colonoscopy versus patients who did not were analyzed.

**Results/Outcome(s):** The incidence of incidental colorectal lesions in melanoma patients who had PET/CT scans was 3.2%. Of the 81 patients who were found to have such a lesion, 56% underwent colonoscopy. Of these, premalignant or malignant disease was found in 72.2%.

**P543 Table 1 Individual Changes in mesorectal and total pelvic fat volumes with 4 weeks of VLED**

	Mesorectal adipose volumes				Total intrapelvic adipose volumes			
	Pre-optifast mesorectal adipose volume (cm3)	Post-optifast mesorectal adipose volume (cm3)	Percentage change	increase or decrease	Preoptifast Total intrapelvic adipose (cm3)	Post-optifast Total intrapelvic adipose in (cm3)	Percentage change	increase or decrease
Patient 1	215.67	155.80	-28	decrease	356.98	272.14	-24	decrease
Patient 2	77.15	25.78	-67	decrease	200.78	116.97	-42	decrease
Patient 3	60.58	46.95	-22	decrease	293.69	289.80	-1	decrease
Patient 4	98.6	87.13	-12	decrease	223.79	243.64	9	increase
Patient 5	67	35.8	-47	decrease	148.18	91.24	-38	decrease
Patient 6	80.24	56.25	-30	decrease	132.68	118.45	-11	decrease
Patient 7	158.15	82.12	-48	decrease	324.60	211.24	-35	decrease
Patient 8	23.74	8.62	-64	decrease	41.32	33.19	-20	decrease
Patient 9	16.51	13.04	-21	decrease	41.31	37.93	-8	decrease

Irrespective of disease stage, patients who underwent colonoscopic examination benefited from the intervention.

**Conclusions/Discussion:** The incidence of incidental colorectal lesions identified on PET/CT scans in melanoma patients was found to be equivalent to that in the general cancer population. Patients who underwent colonoscopy benefited from the intervention.

Table.: Comparison of patients who underwent colonoscopy versus those who did not.

	Colonoscopy	Non-Colonoscopy	P Value
Age at Diagnosis of Melanoma	60 years	58 years	0.498
Age at Diagnosis of CI	64 years	63 years	0.574
Time Between Diagnosis of Melanoma and CI	4 years	5 years	0.427
Rate of Diffuse Metastasis	48.89%	66.67%	0.108

	Male	Female	P Value
Percentage of Patients Who Underwent Colonoscopy	37/64 (57%)	8/17 (47%)	0.428

**A NOVEL DERIVATION PREDICTING SURVIVAL AFTER PRIMARY TUMOR RESECTION IN STAGE IV COLORECTAL CANCER: VALIDATION OF A PROGNOSTIC SCORING MODEL AND AN ONLINE CALCULATOR TO PROVIDE INDIVIDUALISED SURVIVAL ESTIMATION.**

P545

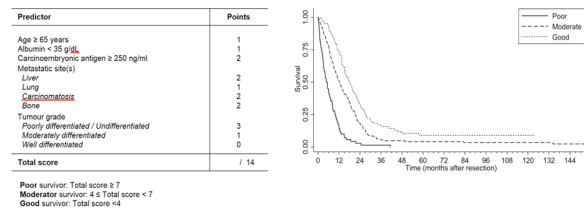
W. Tan, S. Dorajoo, M. Chee, W. Lin, W. Tan, F. Foo, C. Tang, M. Chew  
Singapore, Singapore

**Purpose/Background:** A prognostic scoring model had been devised from our previous study to predict survival following primary tumour resection in patients with metastatic colorectal cancer and unresectable metastases. This has yet been validated on a recent cohort of patients. The objective of this study is to validate the proposed prognostic scoring model and creation of an interactive online calculator to estimate an individual's survival after primary tumour resection.

**Methods/Interventions:** The setting of the study is in a tertiary referral centre for management of colorectal cancer. The study included 324 consecutive patients with metastatic colorectal carcinoma and unresectable metastases who underwent primary tumor resection between January 2008 and December 2013. Clinical data and survival outcomes of patients were extracted from a prospectively maintained database. Patients were categorised into good, moderate, or poor survivor groups based on the previous proposed scoring algorithm. Discrimination was assessed and recalibration was performed, with the recalibrated model implemented as an interactive web application to provide individualised survival probability.

**Results/Outcome(s):** Three hundred and twenty-four patients were included in the study. Median survival in the good, moderate, and poor prognostic groups were 56.8, 25.7, and 19.9 months, respectively (log rank test,  $p = 0.003$ ).  $K$  statistic was 0.638 and  $R^2_D$  was 0.101. Significant differences in survival were found between the moderate and good prognostic groups (HR: 2.79, 95% CI: 1.51 – 5.15,  $p = 0.001$ ) and between poor and good prognostic groups (HR: 4.12, 95% CI: 1.98 – 8.55,  $p < 0.001$ ). Following recalibration, the model was implemented as an interactive online calculator to provide individualised survival estimation after primary tumor resection (<http://bit.ly/Stage4PrognosticScore>).

**Conclusions/Discussion:** *Limitations-* Selection bias and single center data may preclude generalisability of proposed prognostic scoring model. *Conclusions-* The prognostic scoring model provides good prognostic stratification of survival after primary tumor resection and may be a useful tool to guide clinical decision making.



Predictive factors and survival curves based on risk stratification

**ANTIBIOTIC TREATMENT FOR ANTERIOR RESECTION SYNDROME IMPROVES PATIENTS' SUBJECTIVE BOWEL FUNCTION AFTER SURGERY FOR RECTAL CANCER: A RANDOMIZED TRIAL.**

P546

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**Purpose/Background:** With current multimodality treatment up to 75% of patients with rectal cancer are cured. The most debilitating long term effect of rectal resection is intestinal dysfunction or anterior resection syndrome (ARS). Currently there is no proven treatment for ARS. We postulate that an etiological effect of ARS is bacterial overgrowth in the colon and treatment with antibiotics will improve symptoms.

**Methods/Interventions:** Patients with altered bowel function 1-5 years following rectal resection for cancer were randomized to receive Rifaximin 400mgs bid or placebo for 4 weeks. Patients' bowel function was assessed using the MSKCC Bowel Function Index (BFI) before treatment after treatment and 4 weeks later. Patients were also asked the subjective question "Are your symptoms better" each week of the study.

**Results/Outcome(s):** 70 patients were enrolled into the study. 12 patients did not complete treatment and were not evaluable. There was no statistical difference between improvements in BFI scores between the rifaximin or placebo groups. However more patients subjectively reported improvement in bowel function on rifaximin as compared to placebo. (40% vs. 11%,  $p=0.01$ )

**Conclusions/Discussion:** Treatment with Rifaximin subjectively improves symptoms of anterior resection syndrome following rectal resection for rectal cancer but does not demonstrate an objective improvement using the MSKCC BFI.

### SURGICAL MANAGEMENT OF ENDOSCOPICALLY UNRESECTABLE GIANT COLORECTAL POLYPS: CASE SERIES FROM A UK CENTRE BETWEEN 2008 AND 2016.

P547

S. Mahappuge, S. Ishaq, A. Kawesha, K. Marimuthu,  
k. Siau, R. Patel, O. Oluwajobi  
DUDLEY, United Kingdom

**Purpose/Background:** Giant colorectal polyps (3cm or above) carry an associated malignant risk of approximately 40%. Although endoscopic mucosal resection (EMR) is the treatment of choice, surgical resection is considered when endoscopic resection is unsuccessful.

**Methods/Interventions:** We performed a prospective case series of patients who had undergone surgical resection. We collected data over 8 years (From August 2008 to August 2016) in a district general hospital within the United Kingdom with tertiary EMR expertise. Polyp size was measured with an open snare. Standard classifications used. Patients were included in the study if they had giant polyps diagnosed endoscopically, but deemed unresectable or had failed EMR. Standard segmental resections was performed by colorectal surgeons. We assessed the demographics, polyp characteristics, indications, time to surgery, malignancy risk, postoperative complications, length of stay and histology. Data were collected from patient records and hospital databases.

**Results/Outcome(s):** Thirty eight patients ( $n=38$ ) were included (24 males). The mean age was 73.7 years (range 28-90). The majority of lesions were left sided (58%). The mean polyp size was 53mm(range 30- 160mm). Thirty six(95%) were Kudo type IV. The majority of patients were ASA-2( $n=23$ ; 60.5%) while 12 (31.5%) were ASA-3. The indications for surgical referral included: difficult position/non-lifting( $n=22$ ; 58%), suspicious histology and/or imaging( $n=14$ ; 37%), failed multiple EMR( $n=1$ ) and FAP( $n=1$ ). The mean interval between colonoscopy and surgery was 136 days(range 13-357). Surgical resections consisted of the following: right hemicolectomy( $n=16$ ; 42%) (8 laparoscopic), left hemicolectomy( $n=1$ ; 3%), anterior resection( $n=13$ ; 34%), (5 laparoscopic),

laparoscopic abdomino-perineal resection( $n=2$ ), panproctocolectomy( $n=1$ ) and transanal excisions( $n=5$ , 13%). Seven(18.4%) patients required a second surgical procedure. two patients had a permanent stoma. The mean duration of postoperative hospital stay was 6.1 days. In the 90-day postoperative period, no deaths were observed. But surgical complications occurred in 9(24%) patients comprising of deep vein thrombosis( $n=2$ ), surgical site infection( $n=1$ ), ileus( $n= 2$ ), adhesive obstruction( $n=1$ ) and relaparotomy( $n=3$ ). The prevalence of neoplasia on surgical histology which were initially benign from endoscopic biopsy was 15/38(39.4%) of which 7/15(46.7%) were Dukes A

**Conclusions/Discussion: Conclusion** Surgical management of giant polyps carries high morbidity, prolonged length of stay and increased overall cost of treatment. However, malignant lesions were detected in 39.4% which would otherwise have been considered benign. In view of this, we suggest that the management of giant colonic polyps should be discussed in a multidisciplinary setting involving gastroenterologists and surgeons. This will facilitate timely management of polyps deemed unsuitable for endoscopic resection.

### DIAGNOSTIC ACCURACY AND ONCOLOGIC OUTCOMES IN PATIENTS WITH PATHOLOGIC T3 AND T4 COLON CANCER WHO WERE STAGED AS CLINICAL T4 PREOPERATIVELY.

P548

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**Purpose/Background:** Patients who were suspected of having clinical T4 colon cancer preoperatively were frequently diagnosed as T3 stage pathologically, and there was a problem for over-staging. We designed this study to validate an accuracy of preoperative image study for cT4 colon cancer and to compare the survival between pT3 and pT4 groups.

**Methods/Interventions:** Patients who underwent surgery for colon cancer with suspected clinical T4 stage on abdominal computed-tomography (CT) between September 2006 and September 2016 were enrolled in this study. Patients who were diagnosed at pT3 and pT4 stages postoperatively were identified. We compared clinical data and survival rates between the groups.

**Results/Outcome(s):** A total of 40 patients were enrolled as cT4 colon cancer. On preoperative abdominal CT, 67.5% of patients were suspected to cT4 due to direct invasion, 30% were perforation, and 10% were peritumoral seeding nodules. Pathologic outcomes postoperatively showed 14 (35.0%) pT3, and 26 (65.0%) pT4 patients. There were no significant differences in most clinical outcomes between the groups. Fifty-six percent of cT4 patients who were suspected due to direct invasion

of other organs or tissues were diagnosed at pT4. There were more patients who were suspected of having direct invasion preoperatively in the pT4 group compared to the pT3 group (76.9% vs 50.0%,  $p=0.087$ ), but there was no statistical significance. Diagnostic sensitivity was 100%, specificity was 52.0%, positive predictive value (PPV) was 55.6%, and negative predictive value was 100% for direct invasion. For perforation, 100% sensitivity, 71.8% specificity, 8.3% PPV and 100% NPV were seen, but statistical power was low. Significant differences were seen for 5-year overall survival (OS) (100% vs 47.3%,  $p=0.028$ ), but not for 5-year disease-free survival (DFS) (81.5% vs 48.9%,  $p=0.087$ ) between the pT3 and pT4 groups. Patients who received adjuvant chemotherapy showed superior oncologic outcomes in terms of systemic recurrence (5-year DFS, 81.6% vs 0%,  $p=0.006$ ).

**Conclusions/Discussion:** The rate of preoperative over-staging for cT4 colon cancer was high, in particular, for perforation. To achieve better oncologic outcomes, tailored treatment for each patient should be considered base on accurate preoperative diagnosis.

#### PREDICTION OF TUMOR RESPONSE AFTER PREOPERATIVE CHEMORADIOTHERAPY FOR RECTAL CANCER BASED ON PATHOLOGICAL FINDINGS OF PRETREATMENT BIOPSY SPECIMEN.

P549

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**Purpose/Background:** Preoperative chemoradiotherapy (CRT) is useful for local control after resection of rectal cancer, however, CRT results in some toxicities and complications; thus the prediction of tumor response is essential for tailoring treatments for individual patients. We previously reported that increased CD8+ tumor-infiltrating lymphocytes, low tumor expression of CD133, and that of cyclooxygenase-2 (COX-2) could be useful pathological predictive markers of favorable tumor response to CRT (Dis Colon Rectum 2011; Ann Surg Oncol 2014). In this study, we aimed to test the predictive power of the number of these three markers in a retrospective cohort and to evaluate the reproducibility of the findings in another prospective cohort.

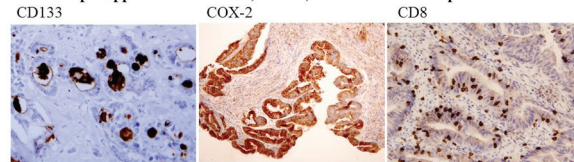
**Methods/Interventions:** First, 95 lower rectal cancer patients who underwent preoperative short-term CRT (20 Gy in 5 fractions with oral Tegafur/Uracyl) followed by radical resection were retrospectively enrolled in this study. Second, we prospectively recruited 40 patients who underwent long-course CRT (45 Gy in 25 fractions with oral S-1 (n=27) or with intravenous irinotecan and oral S-1 (n=13)) followed by radical resection between 2011 and 2016. Immunohistochemical staining with antibodies

for CD8, CD133, and COX-2 was performed on pretreatment biopsy specimens of both cohorts.

**Results/Outcome(s):** In the retrospective cohort, each of increased CD8+ tumor-infiltrating lymphocytes, negativity for CD133, and COX-2 expression was associated with a favorable tumor response (area of tumor cell degeneration/necrosis > 1/3 of the entire tumor lesion;  $p=0.003$ , 0.0002, and 0.005, respectively). When we assessed the number of these factors, the incidence of favorable tumor response was 90% (27/30) in patients with 2 or 3 factors, whereas it was only 40% (26/65) in patients with 0 or 1 factor ( $p<0.0001$ ). In addition, the incidence of T-downstaging was higher in the former (43%) than the latter (22%;  $p=0.03$ ). In the prospective cohort, the predictive value of the number of factors for tumor response was similarly observed; i.e., there were significant differences in the incidence of marked tumor response (tumor cell degeneration/necrosis > 2/3 of the entire lesion) {66.7% (12/18) vs 31.8% (7/22),  $p=0.028$ } and in the incidence of T-downstaging (61.1% vs 18.2%,  $p=0.0086$ ) between the two groups.

**Conclusions/Discussion:** Our study with 2 cohorts demonstrated that the combination of the number of CD8+ tumor-infiltrating lymphocytes and tumor expressions of CD133 and COX-2 could be a useful biomarker in predicting histological tumor regression after preoperative CRT in rectal cancer patients.

Microscopic Appearance of CD133, COX-2, and CD8 Immunoeexpression



#### EFFICACY OF RADIOTHERAPY IN COLORECTAL CANCER WITH RE-RECURRENCE AFTER METASTATECTOMY.

P550

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**Purpose/Background:** Previous studies have shown safety and efficacy of stereotactic body radiotherapy (SBRT) in the treatment of colorectal cancer metastases. However, there were no results whether the SBRT was better or not than conventional treatment. Most studies have not compared SBRT and conventional therapy like metastatectomy or chemotherapy. The comparison of treatment is difficult due to heterogeneity in primary tumor, metastases and previous treatment. The aim of this study was to compare the outcomes between SBRT and conventional therapy in highly selected patients with colorectal cancer metastases.



**Methods/Interventions:** This study was retrospective review. Patients enrolled this study from January 2008 to August 2015. Inclusion criteria were 1) histologic proven colorectal adenocarcinoma; 2) radical resection of the primary tumor; 3) local treatment of the first metastases; 3) re-recurrence after local treatment of the first metastases; and 4) operable re-recurrence judged by a trained colorectal surgeon and amendable for other local treatment. All metastases were hepatic and/or pulmonary metastases. The local treatment included metastatectomy and radiofrequency ablation. Of 538 patients with metastases, 15 patients underwent conventional treatment for re-recurrence and 10 patients underwent radiotherapy for re-recurrence. We divided the patients with re-recurrence after local treatment of the first metastases; the conventional therapy group (CT group, n=15) and SBRT group (RT group, n=10). The conventional therapy included metastatectomy and/or chemotherapy.

**Results/Outcome(s):** The clinicopathologic parameters were similar between two groups except initial T stage. T stage of the CT group was earlier than that of the RT group ( $P=0.009$ ). Mean total follow-up period was  $46.33\pm 18.44$  months in the CT group and  $40.90\pm 21.82$  months in the RT group. Re-recurrence lesions in the CT group were 10 patients with liver, 4 patients with lung, and 1 patient with liver and lung. Re-recurrence lesions in the RT group were 5 patients with liver, 4 patients with lung, and 1 patient with liver and lung ( $P=0.707$ ). Sum of size of re-recurrence lesion was  $2.37\pm 1.33$  cm in CT group and  $2.19\pm 1.43$  cm in RT group ( $P=0.746$ ). Mean number of re-recurrence lesion was  $1.73\pm 1.28$  in CT group and  $1.80\pm 0.79$  in RT group ( $P=0.885$ ). After treatment of re-recurrence, 13 patients (86.7%) in CT group and 3 patients (30%) in RT group underwent failure of treatment ( $P=0.009$ ). In the CT group, 8 (100%) patients who received chemotherapy underwent treatment failure. In the CT group, 5 (71.4%) patients who received metastatectomy underwent treatment failure. Mean disease free period after re-recurrence was  $19.4\pm 5.2$  months in CT group and  $28.8\pm 5.7$  months in RT group ( $P=0.093$ ).

**Conclusions/Discussion:** This study has several limitations. However, radiotherapy for patients with re-recurrence was not worse than conventional therapy. SBRT was feasible, especially highly selected patients.

#### ROBOTIC TRANSANAL MICROSURGERY FOR EARLY RECTAL NEOPLASIA (T0-T1,N0 LESIONS): CASES SERIES OF 10 PATIENTS.

P551

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**Purpose/Background:** In 2016, an estimated 40,000 people will receive a new diagnosis of rectal cancer and while the overall incidence rate and mortality are

decreasing, there is an increasing incidence of rectal cancer in those under the age of 50. The management of low rectal cancers is rapidly evolving. Current guidelines limit transanal excision of early rectal neoplasia to within 8cm of the anal verge however using robotic assisted microsurgery, we report multiple successful transanal excisions average 11.6cm from the anal verge.

**Methods/Interventions:** We retrospectively reviewed ten patients who underwent robotic assisted transanal surgery for early stage disease (T0-T1, N0) between Q3 2013 and Q2 2016. Our operative setup utilizes a GelPOINT path, two 5mm ports for the robotic arms oriented in parallel fashion, an 8mm port for the camera and a 5mm assistant port.

**Results/Outcome(s):** There were seven males and three females with an average age at surgery of 56 years (range 40-83 yr). All were diagnosed preoperatively by colonoscopy; two had biopsy proven adenocarcinoma, four had tubulovillous/villous adenomatous dysplasia and three had tubular adenomas. Only one case was upstaged from tubulovillous adenomatous features to adenocarcinoma during definitive resection however this remained a T1N0M0 lesion with negative margins. The average distance from the anal verge was 11cm (range 6-20cm) and all surgical margins were clear of microscopic disease. Four cases required conversion from transanal; one of the four required robotic abdominal access to repair a proctotomy. The average operative time was 167 minutes (range 101-361 minutes) and the average blood loss was 40cc (range 5-100cc). There was no re-admissions within 30 days of surgery. Six month follow up was available for 70% of patients and showed no evidence of recurrence.

**Conclusions/Discussion:** Progressive screening programs for colorectal pathology have provided the field with opportunities to treat early stage disease surgically for cure. Transanal robotic surgery gives the surgeon the tools to address pathology farther from the anal verge than was previously possible. Outcomes data is promising but long term follow up and larger cohort analyses is encouraged.

#### MICROBIOCENOSIS FEATURES OF LOWER GUT IN PATIENTS WITH COLORECTAL CANCER.

P552

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**Purpose/Background:** Effects of colonic microbiota on surgical outcomes and incidence of postoperative complications have been described, but these findings are rather controversial.

**Methods/Interventions:** In the prospective comparative study, pre- and post-operation colonic microflora were analyzed using real-time PCR. The study was conducted at the Department of Oncology of Academician I.P.

Pavlov First St. Petersburg State Medical University, St. Petersburg, Russia. Thirty-eight patients undergoing colon and rectum resection at our University between 2014 and 2015 were included. All patients underwent surgery as scheduled. Standard-volume operations were performed laparoscopically in 66% (n = 25) of cases, whereas open surgery was performed in 34% (n = 13) of cases.

**Results/Outcome(s):** Changes in microflora changes did not depend on patient gender or age, scope or method of surgical intervention, or tumor-induced stenosis and infiltration (p %0.05). Significantly elevated *Lactobacillus* spp., *Bifidobacterium* spp., and *Bacteroides fragilis* group levels in all patient categories somewhat contradicted previous reports. Significant anaerobic imbalance was most frequently diagnosed during the postoperative period, especially after antibiotic prophylaxis and therapy. *C. difficile* and *C. perfringens* were most frequently diagnosed in patients with tumors of the right colon (p ≤ 0.05). One month after surgery, 34% (n = 13) patients exhibited signs of irritable bowel syndrome, most of whom were diagnosed with Clostridial infection during the postoperative period.

**Conclusions/Discussion:** These findings suggest that stool microbiota analysis of patients with colon cancer should be performed before and after surgery. If opportunistic pathogenic microflora levels are elevated, preoperative decontamination should be performed using enterotropic antibiotics or personalized antibiotic prophylaxis, followed by mandatory postoperative analysis and outpatient treatment.

## MELANOMA METASTATIC TO THE COLON AND RECTUM.

P553

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**Purpose/Background:** Melanoma metastatic to the colon and rectum is rare, and less than 5% of colorectal melanoma metastases are diagnosed pre-mortem. There are currently no large studies in the literature that have examined the incidence and natural history of melanoma metastases to the colon and rectum. The aim of this study was to identify the incidence, clinicopathologic characteristics, and survival of patients diagnosed with colorectal melanoma metastases.

**Methods/Interventions:** A retrospective review was performed of all patients diagnosed with melanoma (1964-2014) at surgical units affiliated with Melanoma Institute Australia (MIA). The MIA Research database was interrogated to identify patients diagnosed with metastases in the colon and rectum, and data were obtained relating to patient demographics, clinico-pathological features and overall disease management.

**Results/Outcome(s):** Of 38,279 patients diagnosed with melanoma over the 40-year period, 6,020 developed

distant metastatic disease. 106 patients (0.3%, 64 males, mean age 51.0 years [SD: 16.3]) were identified who had colorectal metastases either at the time of initial diagnosis or during disease surveillance. The mean interval between diagnosis of primary cutaneous melanoma and large bowel metastasis was 62.8 months [range: 1-476]. The large bowel was the sole site of metastasis in almost one-half of cases (n=50, 47.2%), while other sites were also involved in 56 cases (52.8%). The most commonly affected colonic site was the transverse colon, identified in 27 (25.5%) patients. 16 (15.1%) patients were asymptomatic; in symptomatic patients, rectal bleeding was the most common symptom (n=19, 17.9%), followed by anaemia (n=13, 12.3%), abdominal pain (n=13, 12.3%), and abdominal distension (n=11, 10.4%). Large bowel metastases were almost universally diagnosed by computed tomography (CT) (n=103, 97.2%), while adjuncts to diagnosis included colonoscopy in 88 patients (83.0%), and positron emission tomography (PET) in 51 (48.1%). 77 patients (72.6%) underwent segmental resection and 29 (27.4%) were managed non-operatively.

**Conclusions/Discussion:** Though a rare entity, this study provides a comprehensive assessment of the natural history and outcomes of patients diagnosed with melanoma metastatic to the large bowel. When diagnosed, large bowel metastases are the solitary site of metastasis in one-half of cases. Most patients present with symptoms, most commonly rectal bleeding. CT imaging remains an important diagnostic tool for this condition.

## BARBED VERSUS TRADITIONAL SUTURE FOR ENTEROTOMY CLOSURE AFTER LAPAROSCOPIC RIGHT COLECTOMY WITH INTRACORPOREAL MECHANICAL ANASTOMOSIS: A CASE-CONTROL STUDY.

P554

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**Purpose/Background:** To date the efficacy of barbed sutures has been evaluated in different types of surgery however, no studies about colorectal surgery are available. Our aim was to establish the safety and efficacy of barbed suture for enterotomy closure after laparoscopic right colectomy with intracorporeal anastomosis.

**Methods/Interventions:** This study was designed as a case-controlled study from a prospective colorectal cancer database. This study included 47 patients who underwent laparoscopic right hemicolectomy with intracorporeal mechanical anastomosis and barbed suture enterotomy closure (Barbed Suture Closure – BSC) for adenocarcinoma (with the exception of T4 lesions and metastasis), compared with 47 matched patients who underwent laparoscopic right hemicolectomy with

intracorporeal mechanical anastomosis and conventional suture enterotomy closure (Conventional Suture Closure – CSC) during the same period. Controls were matched for stage, age, and gender via a statistically generated selection of all laparoscopic right hemicolectomies performed from January 2009 until December 2015.

**Results/Outcome(s):** There was no difference between the two groups in terms of age, sex, BMI, ASA, co-morbidity, previous abdominal surgery, cancer site and cancer staging. In terms of operating time (median 120 minutes for BSC and 127.5 minutes for CSC), histopathological results, surgical site complications (2.1% for BSC and 8.5% for CSC), hospitalization (median 6 days for BSC and 5 days for CSC), readmission rate (0%), there were no differences between the groups ( $p > 0.05$ ). No significant differences were noted between the two groups in terms of the postoperative course, except for analgesic drug consumption, which was less in the CSC group ( $p=0.039$ ). Regarding the non-surgical site complications, only one case was observed in the CSC group while nine cases were observed in the BSC group ( $p=0.019$ ).

**Conclusions/Discussion:** Our results support that the use of knotless barbed sutures for enterotomy closure after laparoscopic right colectomy with intracorporeal mechanical anastomosis is safe and reproducible.

## FUNCTIONAL OUTCOMES AFTER RECTAL SURGERY: COMPARISON OF TWO VALIDATED BOWEL FUNCTION INSTRUMENTS AND ASSOCIATIONS WITH QUALITY OF LIFE.

P555

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**Purpose/Background:** Patients frequently report bowel dysfunction after rectal cancer surgery. Two questionnaires (the Memorial Sloan-Kettering Cancer Center Bowel Function Instrument [MSKCCBFI] and Low Anterior Resection Syndrome Score [LARSS]) have been separately validated as measures of bowel function after rectal cancer surgery, but it is unclear how these instruments relate to each other and whether there may be an advantage to applying one or both in clinical practice and future research protocols. We assessed the relationship between the MSKCCBFI and LARSS, and how these instruments relate to previously validated quality of life (QoL) measures.

**Methods/Interventions:** As part of a larger study examining bowel function after rectal cancer surgery over time, patients undergoing transanal endoscopic microsurgery (TEMS) or restorative proctectomy for rectal neoplasms, as well as those undergoing colonoscopies (controls), prospectively completed the MSKCCBFI and LARSS, as well as the EORTC Core [C]-30 and Colorectal

[CR]-29 QoL questionnaires. We included only baseline (pre-intervention) data in the present analysis. MSKCCBFI (including subscales) and LARS scores were correlated with Pearson product-moment correlation coefficients. MSKCCBFI and LARS scores were separately correlated with QoL scores using Pearson coefficients.

**Results/Outcome(s):** 91 patients completed baseline assessments, of whom 48 had rectal tumours for which surgery was planned (33 TEMS and 15 restorative proctectomy), while 43 patients were in the group undergoing colonoscopies for a variety of indications, including screening. Mean MSKCCBFI score was  $72.1 \pm 9.8$  (max possible score 90), while mean LARS score was  $19.0 \pm 10.1$  (max. possible score 42), with no differences between any of the intended treatment groups on either instrument. Pearson coefficient  $r = 0.65$  for MSKCCBFI overall score and LARSS, and  $r = 0.44 - 0.61$  for MSKCCBFI urgency, frequency, and dietary subscales, and LARSS. On regression, the urgency score accounted for most of the variation in LARSS among the MSKCCBFI subscale items (standardized beta =  $-0.46$ ). Correlations with QoL measures were moderately large for MSKCCBFI and only moderate for LARSS (Table 1).

**Conclusions/Discussion:** While both the MSKCCBFI and LARSS have been separately validated in rectal cancer patients, the correlation between them is considered only moderately large, which suggests that they are measuring related but not identical constructs. Both can be applied to serially measure bowel function, but LARSS records only the severity of dysfunction. The MSKCCBFI may offer some advantages by including more discrete categories of dysfunction to target for intervention, as well as correlating more strongly with QoL measures.

## TRANSANAL TOTAL MESORECTAL EXCISION VIA HOLY PLANE DISSECTION BASED ON EMBRYOLOGY FOR RECTAL CANCER.

P556

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**Purpose/Background:** The aim of this study was to assess completeness of total mesorectum excision (TME) via holy plane dissection based on embryology after transanal TME (TaTME) for rectal cancer.

**P555 Table 1. Correlations (r) between bowel function and quality of life measures. \*significant at  $< 0.01$  (2-tailed)**

	MSKCCBFI	LARSS
EORTC C-30	0.54*	0.47*
EORTC CR-29	0.58*	0.41*

**Methods/Interventions: Methods:** Prospectively collected data of 15 consecutive patients with rectal cancer who underwent TaTME from November 2014 to October 2016 were enrolled. TME completeness, operative time for completeness of TME was assessed. TME completion time, blood loss, complications, pathological findings and length of hospital stay were also assessed. **Surgical procedure:** After occlusion of the rectum and irrigation with saline, a full-thickness rectal transection for intersphincteric resection (ISR) was initiated circumferentially. The access device was inserted, maintaining pneumoperitoneum at 15 mmHg with carbon dioxide using an AirSeal platform. The dissection started 7 o'clock to 11 o'clock clockwise. Then the dissection proceeded 5 o'clock to 11 o'clock reverse clockwise. After dissection of rectococcygeal muscle at 6 o'clock and rectourethral muscle at 12 o'clock, the holy plane dissected. Then the dissection proceeded lateral side between behind of the neurovascular bundle and rectum with appropriated tension. The dissection proceeded toward presacral plane and peritoneal reflection. Laparoscopic TME simultaneously performed via medial approach. IMA divided at the loot, and IMV divided at lower edge of pancreas, and splenic flexure mobilized. Then the dissection connected to the TaTME plane.

**Results/Outcome(s): Results:** TME completion performed in all patients. All patients had negative of circumferential resection margin. Mean of TME completion time and blood loss were 146 min and 95 g, respectively. No patient had an intraoperative complication and 3 patients had postoperative complications. No other complications occurred. The length of hospital stay was 12 days.

**Conclusions/Discussion:** TaTME via holy plane dissection based on embryology is a safe and feasible procedure for treatment of rectal cancer.

#### OUTCOMES OF TRANSANAL ENDOSCOPIC MICROSURGERY (TEM) FOR THE SURGICAL MANAGEMENT OF T2 AND T3 RECTAL CANCER.

P557

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**Purpose/Background:** Transanal endoscopic microsurgery (TEM) is an emerging surgical therapy for rectal cancer. Evidence supports the use of TEM for selected T1 rectal cancers, but has been discouraging for more advanced lesions. At St. Paul's Hospital (SPH), patients with T2/3 adenocarcinoma are recommended for radical resection; only patients with prohibitive co-morbidity or those who refuse conventional treatment receive TEM. The objective of this study was to assess the outcome of

TEM as the sole surgical treatment for T2 and T3 rectal cancers at our institution.

**Methods/Interventions:** At SPH, demographic, operative, pathologic and follow up data has been collected and maintained for all patients treated by TEM in the SPH TEM database. For this study, we included all patients with pathology confirmed T2 or T3 adenocarcinoma. Patients were excluded if they underwent radical resection following TEM, or if TEM was performed for a rectal cancer recurrence. Sub-group analysis was performed by final tumour stage (T2 vs. T3) and reason for TEM resection (patient co-morbidity vs. patient refusal). Peri-operative outcomes, pathologic features and margin status, disease-free survival (DFS) and overall survival (OS) were assessed. Kaplan-Meier survival analyses were performed for DFS, OS and estimated 5-year survival outcomes.

**Results/Outcome(s):** Between May 1, 2007 and August 31, 2016, 45 patients were treated by TEM for T2 (N=33) or T3 (N=12) rectal cancer. Twenty-seven patients were recommended to have TEM due to significant co-morbidity precluding major surgery, while 18 patients refused oncologic resection despite surgeon recommendation. There were no major intra-operative complications. Post-operative morbidity occurred in 26.7% of patients (N=12), although the majority of these complications were minor (83.3% with Clavien-Dindo classification  $\leq 2$ , N=10). On final pathology, 35.6% specimens had a positive margin (N=16) and one-third had high-risk features (N=15), both of which were significantly more common for T3 lesions. Median follow-up time was 23 months (range 1-91 months). Overall mortality was 42.2% (N=19) and 17.8% of patients had disease recurrence (N=9, 3 local and 6 metastatic). Five-year survival rates were 73.7% for DFS and 49.0% for OS. OS was significantly better for T2 tumors and patient who refused radical resection (see table). Patients who received neo-adjuvant and adjuvant therapy also had trends towards improved survival.

**Conclusions/Discussion:** Oncologic outcomes are sub-optimal following TEM for T2 and T3 rectal cancer, in particular for T3 lesions. However, prolonged survival can be seen in some patients who refuse more radical treatment. More studies are needed to determine the role of adjuvant therapy to TEM for T2 and T3 rectal cancers.

## SURGEON PERSONAL VALUES AND CARE PROVIDED NEAR THE END OF LIFE FOR COLORECTAL CANCER PATIENTS: RESULTS OF AN ASCRS SURVEY.

P558

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**Purpose/Background:** Colorectal cancer is the third leading cause of cancer death in the U.S. and one of the most common reasons for performing palliative surgical interventions. Decisions regarding care nearing the end of life are informed by clinical information as well as patient preferences and values. However, it is unclear how surgeons approach these situations with patients. Observers in the medical and sociological literature describe a notable reluctance among surgeons to openly confront issues of end-of-life decision-making and care. But, there is little empirical evidence directly from surgeons regarding how they approach these situations. We conducted a national survey designed to understand surgeon perceived barriers to palliative and end-of-life care.

**Methods/Interventions:** Using a survey developed and validated by the Critical Care Peer Workgroup of the Robert Wood Johnson Foundation's Promoting Excellence in End-of-Life Care Project, we recruited all members of the American Society of Colon and Rectal Surgeons to participate in a web-based survey. The survey is divided into three domains characterizing barriers to optimal end-of-life care: patient/family factors, clinician factors, and systems factors. We also included five open-ended questions regarding personal experiences and training in palliative and end-of-life care.

**Results/Outcome(s):** The survey response rate was 16.6%. Less than 25% of respondents reported that they had received any formal training in palliative and end-of-life care and only 3.7% of respondents reported that this

occurred while in residency or fellowship. Of respondents, 71% reported a personal experience of having a family member or friend who died, and surgeons reported that the experience had positively impacted the way in which they care for patients. Surgeons report that they consider a good death to be characterized by a lack of suffering, avoidance of aggressive and/or futile care, a rapid time course, and the presence of loved ones. However, of the clinician factors, 38 to 43% of respondents reported deficiencies in end-of-life training as large or huge barriers to optimal care, 31% reported psychological or emotional stress as large or huge barriers, and more than 50% reported a lack of time as a large or huge barrier to optimal care.

**Conclusions/Discussion:** Surgeons who care for patients with advanced colon and rectal malignancies value quality of life at the end-of-life, yet report a lack of formal training or skills to provide this important care. In this context, personal experience with death appears to positively impact surgeon comfort in communicating with patients. New initiatives should be aimed at improving formal training and time for conversations with patients, in order to reduce discrepancies between surgeon values and the actual care that surgeons provide.

## TRANSANAL ENDOSCOPIC MICROSURGERY (TEM): THE LEARNING CURVE.

P559

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**Purpose/Background:** Transanal endoscopic microsurgery (TEM) is being increasingly utilized for excision of rectal neoplasms. As a new technique, a significant learning curve is expected. We aim to determine the number of cases at which proficiency is attained, measured by operative time.

**P557 Survival outcomes for T2/T3 adenocarcinoma of the rectum treated with TEM**

	DFS with 95% CI (months)	Estimated 5-year DFS	p-value	OS with 95% CI (months)	Estimated 5-year OS	p-value
Total Cohort	71.1 (59.0-83.2)	73.7%	N/A	49.0 (19.3-78.7)	45.0%	N/A
Tumour stage						
T2	77.6 (65.7-89.6)	80.8%	0.026	27.7 (34.6-143.4)	53.3%	0.006
T3	48.3 (24.5-72.0)	57.1%		7.4 (9.4-38.6)	12.2%	
Reason for TEM						
Co-morbidity	72.5 (56.1-88.9)	77.6%	0.942	34.5 (20.9-48.0)	17.8%	0.001
Refusal	67.0 (51.0-83.0)	71.6%		76.3 (63.9-88.9)	83.6%	
Additional Therapy						
No therapy	56.3 (37.6-75.0)	64.6%	0.288	36.3 (24.0-48.5)	12.8%	0.211
Neo-adjuvant	62.2 (39.1-85.3)	70.3%		54.6 (30.5-78.8)	57.0%	
Adjuvant	84.8 (73.3-96.3)	88.9%		66.3 (45.1-87.5)	66.7%	

CI=confidence interval, DFS=disease-free survival, OS=overall survival

**Methods/Interventions:** At St. Paul's Hospital, demographic, surgical, pathologic and followup data is captured in a prospectively-collected SPHTEM database. Operation time (OT) was selected as a measure of proficiency, adjusting for tumour size (cm<sup>2</sup>), tumour location (anterior, posterior, lateral), tumour height, peritoneal breach, and tumour recurrence status, parameters relevant in attaining proficiency. Restricted cubic spline curves were plotted to determine inflection points for OT by number of cases, and comparison of OT before and after inflection points was conducted.

**Results/Outcome(s):** Between March 2007 and April 2015, 490 patients were treated by TEM (by surgeons performing >100 cases each). Complete data were available for 466 patients. The mean overall OT was 54±31 min. After adjusting for relevant factors, only one inflection point was observed, at 50 procedures, and was consistent between surgeons. Comparisons were conducted across three groups: one prior to the inflection and two after. Comparison between the two latter groups was done to determine whether, in the absence of additional observed inflection points, there was further improvement in OT with additional cases. There was a significant difference in OT before and after 50 cases (p<0.001), but not between the two groups after the inflection point (p=0.07).

**Conclusions/Discussion:** We conclude that proficiency in TEM is consistently achieved after performing 50 procedures. These findings reflect the learning curve of colorectal surgeons proficient in laparoscopy. Volume of TEM cases available should be considered when implementing TEM into a hospital, considering costs and time required to attain proficiency. Further study is needed to determine competency limits for trainees and the role of simulation in achieving proficiency.

#### MANAGEMENT OF LARGE CECAL POLYPS: WHEN CAN THE ILEOCECAL VALVE BE SPARED?

P560

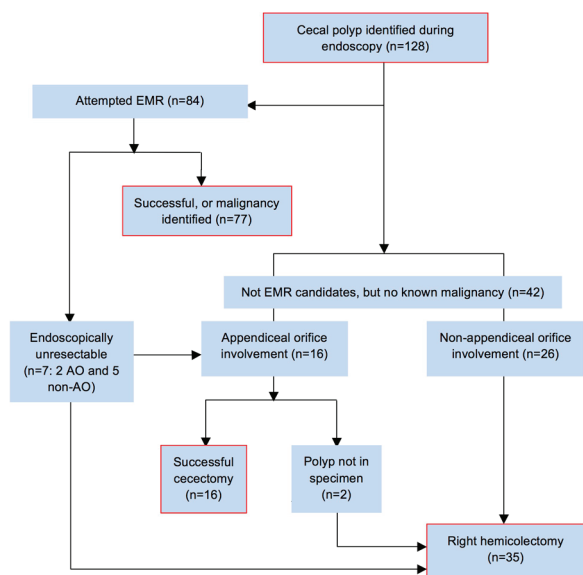
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**Purpose/Background:** Endoscopic mucosal resection (EMR) comprises the first-line treatment for large cecal polyps. With up to 14% of unresectable colonic polyps harboring malignancy, the management of endoscopically unresectable cecal polyps remains an oncologic right hemicolectomy. In the majority of patients for whom no malignancy is identified, however, this procedure is associated with substantial postoperative morbidity. This study aims to compare the outcomes of patients with cecal polyps who undergo either EMR, a limited cecectomy, or a right hemicolectomy.

**Methods/Interventions:** All patients undergoing treatment for large cecal polyps, without known malignancy or secondary indications for colon resection, were identified within our institutional database between 2008 and 2016, and stratified by whether they underwent EMR, cecectomy alone (CC), or formal right hemicolectomy (RH). Procedural complications were compared between the three cohorts. Outcomes between the two surgical cohorts (CC and RH) were compared using Wilcoxon rank sum tests and Fisher's exact tests, including operative duration, estimated blood loss, and length of stay.

**Results/Outcome(s):** 128 patients with cecal polyps were identified: 84 (60.2%) initially underwent EMR, 16 (12.5%) underwent CC, and 35 (27.3%) underwent RH. Seven patients with attempted EMR required surgical resection, and two patients initially undergoing CC were converted to formal RH when the polyp was not identified within the specimen (Figure). The two surgical cohorts did not differ significantly regarding age, sex, or ASA classification. Procedural complication rates were highest among those undergoing RH, followed by EMR and cecectomy (37.1%, 10.7%, and 6.3%, p=0.002). Estimated blood loss (median 50 vs. 10 mL, p=0.019) and operative duration (median 98 minutes vs. 76 minutes, p=0.009) were higher in RH compared to CC, as was length of stay (median 4 vs. 2 days, p<0.001). Two invasive adenocarcinomas (2.3%) were identified after EMR, which underwent subsequent resection (but not included in our RH cohort due to confirmed malignancy). No malignancies were identified upon final pathology within the CC cohort, but four patients in the RH cohort were found to have neoplastic disease: 2 (5.7%) low-grade appendiceal mucinous neoplasms, 1 (2.9%) low-grade mucinous adenocarcinoma, and 1 (2.9%) adenocarcinoma *in situ*.

**Conclusions/Discussion:** In tertiary centers, the majority of large cecal polyps are benign and can be addressed using EMR. When involvement of appendiceal orifice or ileocecal valve precludes excision during the index colonoscopy, surgical resection is the standard of care. In the subset of cases not involving the ileocecal valve, and for whom preoperative biopsies did not show evidence of malignancy, cecectomy can offer reduced postoperative morbidity and length of stay compared to formal right hemicolectomy. Intraoperative specimen examination to ensure complete resection is recommended.



## NONOPERATIVE MANAGEMENT OF RECTAL CANCER DEMONSTRATING COMPLETE CLINICAL RESPONSE FOLLOWING NEOADJUVANT CHEMORADIATION: A SYSTEMATIC REVIEW AND META-ANALYSIS.

P561

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**Purpose/Background:** Non-operative management (NOM) of patients who demonstrate a complete clinical response to neoadjuvant therapy has the potential to avoid the morbidity associated with conventional surgical treatments for rectal cancer, especially in the setting where sphincter-preservation is not possible. However, NOM remains controversial. We aim to synthesize the literature reporting long-term outcomes for patients treated with NOM.

**Methods/Interventions:** A systematic search was performed in MEDLINE, EMBASE, and the grey literature. Articles reporting outcomes of patients with rectal adenocarcinoma treated with NOM after complete clinical response (cCR) to neoadjuvant chemoradiation were identified. 2-year local regrowth rates were pooled using a random-effects model. Comparative studies including groups who underwent radical surgery despite cCR or those found to have complete pathologic response (cPR) at the time of radical resection were analyzed separately. Disease-free survival (DFS), non-regrowth recurrence (non-luminal intrapelvic recurrence and/or distant metastases), cancer-specific mortality, and overall survival (OS) were meta-analyzed across comparative studies.

**Results/Outcome(s):** The database search yielded 1844 records. Twenty-three observational studies, including 861 patients, met inclusion criteria. Nine comparative studies were identified. Males accounted for 64.2% of

patients; median age ranged from 54-75 years. Pooled 2-year regrowth rate was 16.4% (95% CI, 12.5-20.3%). Increasing time from chemoradiation to assessment of cCR was associated with lower rates of local regrowth ( $p=0.02$ ). Compared to patients who demonstrated cPR at surgery, those with cCR managed with NOM demonstrated no differences in non-regrowth recurrences (pooled OR, 1.09; 95% CI, 0.52-2.28), disease-free survival (pooled HR, 0.73; 95% CI, 0.30-1.76), cancer-specific mortality (pooled OR, 0.71; 95% CI, 0.30-1.68), or overall survival (pooled HR, 1.52; 95% CI, 0.40-5.74). Similarly, there were no significant differences between patients with cCR managed with NOM vs. those managed surgically with respect to non-regrowth recurrences (pooled OR, 0.53; 95% CI 0.14-2.01), DFS (pooled HR, 0.56; 95% CI 0.20-1.60), cancer-specific mortality (pooled OR, 0.55; 95% CI, 0.05-5.85), or OS (pooled HR, 3.91; 95% CI, 0.57-26.72).

**Conclusions/Discussion:** NOM with strict selection criteria and close follow-up appears to be a safe therapeutic option for patients demonstrating cCR to neoadjuvant chemoradiation. Despite the paucity of comparative data, surgical resection does not appear to confer a survival advantage in patients with cCR.

## LAPAROSCOPY-ASSISTED ROBOTIC TRANSANAL TOTAL MESORECTAL EXCISION: A PRELIMINARY 20-CASE SERIES REPORT.

P562

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**Purpose/Background:** Utilization of Minimally Invasive Surgery in the treatment of rectal cancer has been a key development in recent years, and Transanal Total Mesorectal Excision (TaTME), which encompasses trans-abdominal laparoscopic assistance, is becoming an increasingly favored approach in the field of rectal surgery. Several preliminary series have already demonstrated that TaTME for rectal cancer not only meets safety and feasibility markers, but also achieves longer distal margin lengths and decreases operative time when performed via a two-team approach. Furthermore, Surgical Robotics is believed to increase operative stability while manipulating restricted surgical fields. In this series report, we aim to delineate and discuss preliminary findings from our Surgical Robotic TaTME experiences.

**Methods/Interventions:** A total of twenty patients (12 males) who received Robotic TaTME assisted by Laparoscopy (rTaTME) between January 2016 and November 2016 at a single institution were documented. Surgical outcomes, including complications, pathological outcomes, and short-term results, were prospectively analyzed.

**Results/Outcome(s):** All patients underwent rTaTME via a two-team approach. The "abdominal team" operated via a single port method (ileostomy site), while the

“transanal team” operated via the DaVinci Xi system. The mean patient age was 56.7±14.3 years (range 31-79), and the mean distance between tumor and anal verge was 6.0±2.7cm (range 2-10). The mean estimated intraoperative blood loss was 88±107ml (range 30-500), and circular stapling was utilized to restore continuity in 80% patients. The overall postoperative complication rate was 35%, and the mean distal margin length was 3.1±1.3cm. There were 2 patients who had a circumferential margin (CRM) involved by cancer cells (≤1mm).

**Conclusions/Discussion:** Our preliminary series report demonstrates that utilization of the DaVinci Xi system in TaTME is feasible and safe. In addition, the system’s robotic arm wrist greatly assists in performing the distal rectal stump purse-string suture. However, we also identified areas for improvement, including a narrower robotic arm to facilitate easier transanal approach and improvement of the robotic docking system. We anticipate that robotic systems uniquely designed for single port surgery, as such the DaVinci SP, will open even more frontiers for transanal approach surgery.

#### POSTOPERATIVE CEA STATUS PREDICTS EARLY RECURRENCE AFTER COMPLETE CYTOREDUCTION AND HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY FOR PSEUDOMYXOMA PERITONEI.

P563

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**Purpose/Background:** Cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) are the current optimal treatments for pseudomyxoma peritonei (PMP), but disease often recurs. Elevation of the preoperative tumor markers in PMP is a risk factor for recurrence and a reduction or normalization of CEA level is observed after surgery. The aim of this study was to evaluate the prognostic value of a change in CEA level after CRS and HIPEC.

**Methods/Interventions:** This was an observational prospective study of patients with PMP treated at our single institution between March 2010 and April 2015. Of the 75 consecutive patients, 50 patients who underwent complete CRS and HIPEC were identified. Serum CEA level was measured within 2 weeks before surgery and 3 months post-operatively. Patients were classified into 3 groups, based on their CEA levels (Group A: pre-operative CEA <5ng/ml; Group B: pre-operative CEA ≥5ng/ml and post-operative CEA <5ng/ml; and Group C: pre-operative CEA ≥5ng/ml and post-operative CEA ≥5ng/ml). Recurrence and survival correlated with the change in CEA level.

**Results/Outcome(s):** With a median follow-up time of 12.3 (range, 1.3-59.5) month, the recurrence

occurred in 14 (28%) of all patients. The median (range) pre-operative level of CEA in the patients who developed recurrence tended to be higher when compared with the patients who had no recurrence (34.7(2.7-4396.2) vs. 9.8(1.3-152.6);  $P=0.224$ ). The recurrence occurred in 2 (17%) of 12 patients with a normal CEA pre-operatively and in 12 (32%) of 38 patients with an elevated CEA ( $P=0.468$ ). The elevated CEA was not normalized in 4 (11%) of 38 patients after surgery and recurrence occurred in all patients with an elevated CEA post-operatively. The disease-free interval was 15.1 months in Group A, 14.6 months in Group B and 10.2 months in Group C ( $P=0.713$ ). The recurrence free survival (RFS) in Group A and Group B were similar, while Group C showed a significantly lower RFS (39.1 vs. 40.1 vs. 10.3 months, respectively) ( $P<0.001$ ). The overall survival tended to be lower in Group C, but not statistically significant (42.3 vs. 53.0 vs. 24.2 months) ( $P=0.101$ ).

**Conclusions/Discussion:** Elevated post-operative CEA can predict an increased risk of recurrence and reduced survival after complete CRS and HIPEC.

#### RADIOLOGICAL FEATURES OF COMPLETE PATHOLOGICAL RESPONSE AFTER NEOADJUVANT THERAPY FOR RECTAL CANCER.

P564

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**Purpose/Background:** Neoadjuvant therapy is now the standard of care for locally advanced or node positive rectal cancer. Patients with complete pathological response carry excellent prognosis. “Wait-and-see” approach can be considered for those with clinical and radiological evidence of complete response. Controversies exist regarding MRI prediction of complete treatment response. We would like to describe radiological features of the patients with complete pathological responses in MRI after neoadjuvant therapy.

**Methods/Interventions:** Patients received neoadjuvant chemoradiation for rectal cancer from January, 2013 to December 2015 in Pamela Youde Nethersole Eastern Hospital are reviewed. The data of patients with complete pathological response was retrieved from a prospectively maintained database of 64 patients with rectal cancer who had undergone surgery after neoadjuvant chemoradiation. The restaging MRIs of those patients were reviewed by a dedicated radiologist for rectal cancer in our multidisciplinary colorectal team to assess for any common features of complete pathological response. Assessment is based on T2 high resolution axial scans. Features of complete pathological response includes: (1) Complete T2 hypointense signal indicating tumour fibrosis. (2) absence of residual tumor signal (intermediate T2 hyperintense signal).



**Results/Outcome(s):** 6 out of 64 patients had complete pathological features and the overall complete pathologica response rate was 9.375%. The two features of complete pathological response were present in 4 out of the 6 patients (66.7%).

**Conclusions/Discussion:** The presence of all typical features on restaging MRI pelvis has the potential to be used to identify those patients with complete pathological response. Together with clinical assessment and biopsy, those patients suitable for “wait-and-see” approach might be identified.

### LONGER OPERATIVE TIME IS ASSOCIATED WITH GREATER RISK OF COMPLICATIONS FOR PATIENTS UNDERGOING ABDOMINOPERINEAL RESECTION.

P565

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**Purpose/Background:** The relationship between operative time and surgical complications has been incompletely studied. Some have suggested that longer procedures result in more complications (perhaps by anesthetic complications), while others conclude that shorter operations may require shortcuts and have more frequent complications. In this study, we examine the effect of operative time on patients undergoing abdominoperineal resection for rectal cancer.

**Methods/Interventions:** The 2011–2013 NSQIP dataset was queried to identify patients undergoing elective abdominoperineal resection (APR) by CPT code. Patients were grouped by operative time based on tertiles of operative time. Overall 30-day complications (including 30-day mortality, readmission, superficial infection, transfusion, organ space SSI, unplanned return to operating room, abscess formation, wound dehiscence, postoperative pneumonia, failure to wean from ventilator, stroke or CVA, cardiac arrest, myocardial infarction, septic shock, pulmonary embolism, deep vein thrombosis, or progressive renal insufficiency), length of stay, readmission, and 30-day mortality were compared between groups after multivariable adjustment for clinical and disease characteristics.

**Results/Outcome(s):** We identified 2,414 patients who underwent APR. Operative times were subset patients into tertiles: 206 minutes or less for the lower tertile (LT), 207-303 minutes for the middle tertile (MT) and greater than 303 minutes for the upper tertile (UT). In total, 1,202 patients were included in the LT, 1,205 in the MT, and 1,199 in the UT. After controlling for age, race, BMI, ASA classification, and work relative value units, longer operative time was significantly associated with increased rates of overall complications for both the MT (OR=1.09 95% CI= 1.05-1.14,  $p<0.001$ ) and UT (OR=1.26 95%

CI= 1.21-1.31,  $p<0.001$ ). Additionally, patients in the upper tertile of operative time experienced an average increase in length of stay of 2.8 days (95% CI 2.3-3.4 days,  $p<0.001$ ) days relative to patients in the LT.

**Conclusions/Discussion:** For patients undergoing APR, longer operative time is associated with a greater risk of overall postoperative complications and increased length of stay despite controlling for comorbidities and complexity. Further investigation is warranted to guide management of patients who are anticipated to undergo lengthy procedures or those who have completed prolonged surgery.

### TUMOR BUDDING STATUS IN STAGE IV COLORECTAL CANCER: POTENTIAL IMPACT ON PROGNOSIS AND BENEFIT OF CHEMOTHERAPY.

P566

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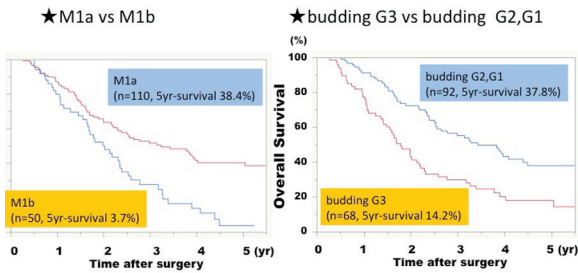
**Purpose/Background:** Tumor budding is recognized as an important risk factor for lymph node metastasis in pT1 colorectal cancer (CRC), and an unfavorable prognostic factor in Stage II patients. However, biological attitude of CRC with high-grade budding and its clinical significance remains unclear in Stage IV CRC setting. The objective of the study was to clarify the prognostic significance of tumor budding in Stage IV patients, and to investigate the relationship between clinical benefits of chemotherapy and tumor budding status.

**Methods/Interventions:** We retrospectively enrolled 160 patients with Stage IV colorectal cancer (M1a, 110; M1b, 50) who underwent primary tumor resection, followed by systemic chemotherapy. Among them, 119 received combination chemotherapy with oxaliplatin or irinotecan (L-OHP/CPT-11) and 41 received 5-fluorouracil (5-FU)-based chemotherapy. We defined the focus of tumor budding as an isolated single cancer cell or a cluster composed of fewer than five cancer cells, and classified the intensity of budding at the hot-spot of individual tumors as low-grade (0–9 foci were found in a x200 microscopic field) or high-grade (10 or more foci in the field).

**Results/Outcome(s):** Five-year overall survival (OS) rate was 37.8% in patients with low-grade budding, whereas it was 14.2% in those with high-grade budding ( $p = 0.002$ ). Adverse prognostic impact of high-grade budding was also observed in the M1a patients (5-year OS, 49.7% in the low-grade budding group and 21.6% in the high-grade budding group;  $p = 0.018$ ) and in the M1b patients (7.3% and 0.0%, respectively;  $p = 0.026$ ). Comparisons of 3-year survival between the combination group and 5-FU-based chemotherapy group showed a significant survival benefit of L-OHP/CPT-11 in the high-grade budding patients (45.9% and 38.6%, respectively;  $p = 0.024$ ), but not

in the low-grade budding patients (55.0% and 54.5%, respectively;  $p = 0.36$ ). Multivariate analysis corroborated the survival benefits of L-OHP/CPT-11 in the high-grade budding patients (hazard ratio = 0.36;  $p = 0.0036$ ), but not in the low-grade budding patients.

**Conclusions/Discussion:** Prognostic significance of tumor budding was shown found observed in Stage IV patients. Tumor budding-high patients received a considerable benefit of L-OHP/CPT-11, while tumor budding-low patients in 5-FU-based chemotherapy group experienced the similar survival to those in combination group.



**THE FATE OF PRESERVED SPHINCTER IN RECTAL CANCER PATIENTS.**

P567

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**Purpose/Background:** Sphincter-saving surgery combined with temporary stoma formation is widely accepted operative modality to treat rectal cancer in contemporary colorectal surgery. sphincter preservation often requires temporary diverting stoma to avoid deadly risk of anastomotic complications. This study investigates the compiled incidence of persistent use of temporary stoma and conversion to permanent stoma. The risk factors associated with non-use of constructed bowel or re-creation of stoma are analyzed.

**Methods/Interventions:** This is a retrospective study conducted at a single institute. A total of 353 patients with primary rectal cancer who underwent surgical resection of the rectum from 2009 to 2013 were identified. Excluding the patients with double primary cancer (n=1); those with multiple colorectal cancer (n=8); those who didn't receive either palliative or curative resection (n=10); the ones who received abdominoperineal resection or Hartmann's procedure (n=17); those only received local excision (n=20); those underwent total or subtotal colectomy; those underwent emergency surgery (n=2); tumors located above 10cm from the anal verge (n=56); and the one with final pathologic confirmation of neuroendocrine tumor (n=1). The patients who subsequently had to develop permanent stoma or were unable to close temporary stoma were compared to the patients without stoma and who succeeded in closure. Fisher's exact test or Student's t test was performed for statistical significance of

categorical variables. Mann—Whitney U test was used for continuous variables. Multivariate analysis was performed to find out the risk factors associated.

**Results/Outcome(s):** Of 236 patients with rectal cancer who received sphincter-saving surgery, temporary stoma was made for 211(89.4%) patients. Stoma was not created in the remaining 25 (10.6%) patients. After median follow-up of 41.5 months, a total of 17 patients (7.2%) demonstrated persistent use or re-formation of stoma. BMI (kg/m<sup>2</sup>), tumor location below 5cm from the anal verge, anastomotic leakage, and local recurrence were significantly associated with persistent use or re-formation of stoma. Multivariate analysis revealed that BMI and tumor location below 5cm from the anal verge are the independent risk factor for persistent use or re-creation of stoma.

**Conclusions/Discussion:** Despite of the effort to preserve sphincter, 7.2% of patients could not use reconstructed bowel after a median follow-up period of 41.5 months. The risk factor analysis implies that obese patients with rectal cancer located below 5cm are likely to possess permanent stoma after sphincter-saving surgery. Therefore, they should be strongly taken into an account before sphincter preservation.

Table 1. Comparison between the patients with and without the permanent stoma formation

	Permanent stoma (-) (n=219)	Permanent stoma (+) (n=17)	P-value
Age (Mean±SD)	63.7±10.7	62.1±11.2	0.68
Sex	Male (n)	122 (91.7%)	0.32
	Female (n)	97 (5.8%)	
BMI (Mean±SDkg/m <sup>2</sup> )	23.7±3.0	26.6±12.4	<0.0001
ASA	I (n)	84 (93.3%)	0.51
	II (n)	135 (92.5%)	
PreOP CEA (Mean±SDug/ml)	11.3±34.2	13.9±22.0	1.0
Tumor location	>5cm (n)	158 (96.3%)	0.003
	≤5cm (n)	61 (84.7%)	
Method of operation	Laparoscopic (n)	208 (93.3%)	0.44
	Open (n)	7 (87.5%)	
	Conversion (n)	4 (80.0%)	
Operation	AR (n)	2 (100%)	0.07
	LAR (n)	169 (94.4%)	
	LATA (n)	48 (87.3%)	
Type of anastomosis	Hand-sewn (n)	48 (87.3%)	0.71
	Stapled (n)	171 (94.5%)	
Anastomotic leakage (n)	Yes (n)	9 (56.3%)	<0.0001
	No (n)	210 (95.5%)	
TNM stage (p or yp)	CR or T1S (n)	25 (92.6%)	0.53
	I/II (n)	114 (94.2%)	
	III/IV (n)	80 (90.9%)	
Pathologic results	PRM (cm)	19.5±7.1	0.35
	DRM (cm)	3.8±2.7	
	Radial margin	8 (80.0%)	
Local recurrence	Yes (n)	8 (61.5%)	0.001
	No (n)	211 (94.6%)	

Table 2. Multivariate analysis

	HR	95% CI	P value
BMI	1.179	1.026-1.354	0.02
AV ≤5cm	11.425	2.114-61.755	0.003

## THE IMPACT OF ABO BLOOD TYPE ON THE PROGNOSIS OF COLON AND RECTAL CANCER.

P568

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**Purpose/Background:** *Background* For more than a century, the ABO blood type has been widely used for classification of human blood by the ABO blood type antigens on red blood cells. As such antigens are expressed on the epithelial cells of several organs including gastrointestinal tract, recently, the prognosis of the patients with blood type AB after curative resection of colon cancer is reported better than those of the other blood types. The objective of this study is to evaluate the correlation of ABO blood type with the prognosis of colon and rectal cancer (CRC).

**Methods/Interventions:** *Method* The objects were 465 CRC patients who underwent curative resection in our institution (median follow up time 28.8 months) during January 2011 and September 2014. Their clinicopathological characteristics and surgical outcomes were collected from their medical records and statistical analysis was performed to clarify the influence of ABO blood type on overall survival (OS).

**Results/Outcome(s):** *Result* The distribution of ABO blood type was 171 blood type A (36.8%), 117 blood type B (25.2%), 123 blood type O (26.5%), and 54 blood type AB (11.6%). There was no significant difference in clinicopathological background factors between ABO blood types. The mean OS for all patients was 28.8 months. In the Kaplan-Meier analysis, the OS of the patients with blood type A was relatively shorter than those with blood type non-A (28.8 vs 31.2 months,  $p=0.057$ ), whereas, multivariate analysis by Cox proportional hazards model revealed no evident correlation (Hazard Ratio (HR): 1.69, 95%Confidential Interval (CI): 0.90-3.17,  $p=0.100$ ). In the subgroup analysis as to primary tumor location, the patients with left-side colon cancer ( $n=140$ ) showed that OS of blood type A group was significantly shorter than that of blood type non-A group (24.0 vs 30.0 months,  $p=0.044$ ) and blood type A was an independent poor prognostic factor (HR: 3.18, 95%CI: 1.10-9.18,  $p=0.032$ ). No relationship was confirmed in right-side colon or rectum.

**Conclusions/Discussion:** *Discussion* Our results were different from recent Chinese paper, in which blood type AB might be a favor prognostic factor in colon cancer, however there are only two study of small samples ever and further investigation is needed. *Conclusion* Blood type A may be an independent risk factor in the patients with left side colon cancer.

## MAGNETIC RESONANCE IMAGING AS A BIOMARKER TO PREDICT HIGH-RISK PATIENTS IN RECTAL CANCER SURGERY: DEFINITION OF A PREDICTIVE SCORE.

P569

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**Purpose/Background:** Rectal cancer surgery is technically challenging and depends on many factors. The aim of our study was to evaluate the influence of clinical and anatomical preoperative factors, particularly pelvic dimensions and mesorectal fat volume to predict surgical difficulty in total mesorectal excision for rectal cancer.

**Methods/Interventions:** Consecutive patients who underwent TME (laparoscopic, robotic or open procedure) for locally-advanced rectal cancer after neoadjuvant treatment between January 2005 and June 2014 were retrospectively included. To evaluate and predict surgical difficulty, we used an in-house surgical grade divided in low versus high difficulty. Preoperative clinical and MRI data were studied in regards of the surgical difficulty grade.

**Results/Outcome(s):** 164 patients, of median age 60.9 years (range 26-86) were included in the study and were divided in two groups: low ( $n=143$ , 87.2%) or high ( $n=21$ , 12.8%) predicted surgical difficulty. In multivariate analysis,  $BMI \geq 30$ , coloanal anastomosis (*versus* colorectal anastomosis), intertuberos distance  $<10\text{cm}$  and mesorectal fat area  $>20.7\text{cm}^2$  were significantly associated with high surgical difficulty. We propose a 4-item score, ranging from 0 to 4, each item (BMI, type of surgery, intertuberos distance and mesorectal fat area) scored 0 or 1, predictive of high-risk patients. Patients could then be considered at high-risk if they have a score of 3 or 4.

**Conclusions/Discussion:** Our study allowed the identification of preoperative factors which may help to predict high-risk surgeries in rectal cancer patients. Larger and prospective studies are needed to validate our results. Definition of these high-risk patients will help surgeons to define the optimal operative strategy and to compare different surgical technique.

## RECURRENCE AND LONG-TERM SURVIVAL FOLLOWING SEGMENTAL COLECTOMY FOR RIGHT-SIDED COLON CANCER IN 813 PATIENTS: A SINGLE-INSTITUTION STUDY.

P570

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**Purpose/Background:** Long-term survival outcomes and patterns of recurrence following segmental colectomy for non-metastatic right-sided colon cancer were studied.

**Methods/Interventions:** We identified all consecutive patients who underwent a right hemicolectomy for colon adenocarcinoma at a single institution from January 2000 to December 2007 and then followed them through October 2016. Data collected included demographics, tumor and pathology characteristics, operative and adjuvant therapies, and recurrence and survival outcomes.

**Results/Outcome(s):** We identified 813 patients, 53% female. Median age was 74.4 years (range, 31 to 99). Tumors were located in the right (92%) and proximal transverse (8%) colon. Grade of tumor was 1 (<1%), 2 (26%), 3 (64%), 4 (9%). Median tumor size was 4.3cm (0.2-16). Median number of lymph nodes retrieved was 18, (1-104). TNM stage was I (27%), II (39%), and III (34%). Adjuvant chemotherapy was administered in 228 patients (40 patients (13%) with stage II disease and 188 patients (68%) with stage III. Any recurrence occurred in 105 patients (13%), at a median time of 1.3 years (range, 4 months – 7.9 years). First recurrence was local/anastomotic in 24 patients (3%), regional in 20 patients (2.5%), and distant in 79 patients (9.7%). At a median follow up of 7.3 years, 398 patients were alive without disease, 8 patients were alive with disease, and 407 patients died. The 1, 3, 5, and 10 year cancer-specific survival was 97.9%, 90.6%, 84.1%, 66.2%, respectively (Figure 1). The 1, 3, 5 and 10 year overall survival was 94.3%, 82.3%, 72.4%, and 48.6%, respectively. The 1, 3, 5 and 10 year disease-free survival was 91.1%, 76.7%, 67%, and 45.8%, respectively. Univariate predictors of recurrence were tumor grade, tumor size, and TNM stage; TNM stage remained significant after multivariable analysis. Univariate predictors of overall survival included age, BMI, tumor size, TNM stage, and use of adjuvant chemotherapy; age, TNM stage, and use of adjuvant chemotherapy remained significant in a multivariable analysis.

**Conclusions/Discussion:** We report excellent long term cancer outcomes from a large cohort of patients with non-metastatic right sided colon adenocarcinoma treated by segmental colectomy. The majority of failures were due to distant disease highlighting the importance of adjuvant chemotherapy in appropriate patients.

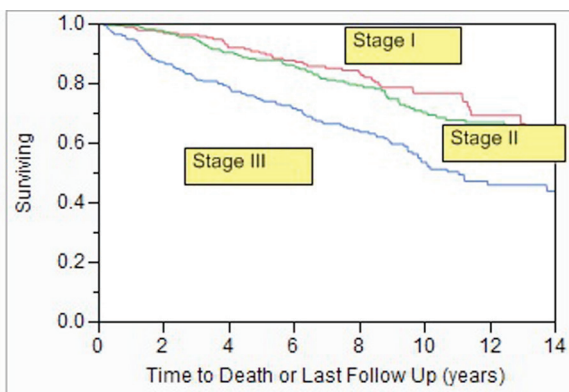


Figure 1 Cancer Specific Survival by TNM Stage

## THE EFFECT OF LAPAROSCOPIC SURGICAL APPROACH ON SHORT-TERM OUTCOMES FOR RECTAL CANCER.

P571

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**Purpose/Background:** The purpose of this study is to evaluate short-term outcomes based on the integration of laparoscopy in rectal cancer surgery. We evaluated three surgical approaches: a pure laparoscopic approach, a hybrid approach of laparoscopy and planned open conversion, and a laparoscopic approach with unplanned conversion.

**Methods/Interventions:** The American College of Surgeons NSQIP Colectomy Module was queried to identify all patients with a principal diagnosis of rectal cancer (ICD-9: 154.1) from 2012 to 2014. The cohort was divided into three groups: pure laparoscopic or hand-assisted laparoscopic proctectomy (Lap), laparoscopic proctectomy with planned open conversion (Planned Open), and laparoscopic proctectomy with unplanned open conversion (Unplanned Open). Demographic, clinical, and outcomes data was collected. Univariate analysis was performed. Statistical analysis was performed using ANOVA, Chi-squared, and non-parametric tests. A p-value of <0.05 was considered statistically significant with a confidence interval of 95%.

**Results/Outcome(s):** 1008 patients met inclusion criteria: 495 were in the Lap group, 385 were in the Planned Open group, and 128 were in the Unplanned Open group. Demographic information revealed that age and gender were no different among the groups. Preoperative patient characteristics demonstrated that there was no differences in most comorbidities including diabetes, smoking history, COPD, dyspnea on moderate exertion, and history of MI. There was an increased BMI in the Unplanned Open group compared to the others [Lap: 27.7 (0.3) kg/m<sup>2</sup>; Planned Open: 27.6 (0.3); Unplanned Open: 30.2 (0.5), p<0.05]. All groups had a similar rate of mechanical bowel prep, but an oral antibiotic prep was used less frequently with the Lap group (Lap: 20.0%; Planned Open: 34.8%; Unplanned Open: 32.8%, p<0.05). Short-term outcomes are shown in Table 1. There was no difference in the anastomotic leak rate among the three groups (Lap: 5.9%; Planned Open: 5.5%; Unplanned Open: 10.2%). Patients in the Unplanned Open group had a statistically significant higher rate of ileus (24.2%), infectious complications (25.8%), pulmonary complications (7.0%), and cardiac complications (3.9%). There was no difference in the distribution of pathologic stage between the three groups. The Unplanned Open group had a higher median (IQR) postoperative length of stay [Lap: 5 (4-6) days; Planned Open: 5 (4-6); Unplanned Open: 6 (5-9), p<0.05]. Readmission rate did not differ among the groups.

**Conclusions/Discussion:** Laparoscopic proctectomy for rectal cancer has similar outcomes if the procedure is

performed laparoscopically with or without planned open conversion while lap with unplanned conversion to open is associated with worse outcomes. Consideration of a patient's BMI in surgical planning and allowing for planned open conversion may prevent significant morbidity with little downside.

#### UTILITY OF ULTRASOUND FOR EARLY DIAGNOSIS OF LIVER METASTASIS DURING COLORECTAL CANCER FOLLOW-UP.

P572

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**Purpose/Background:** The aim of colon cancer follow-up after initial treatment is to identify recurrence as early as possible. On the other hand, the most frequent distant recurrence site is the liver, and recurrences occur specially during the first two years after surgery. The majority of guidelines recommend the use of computed tomography (CT) scan every 6 months, but little is known about the potential benefits of adding an abdominal ultrasound (US) interleaved between the CT scans. The objective of this study was to analyze the utility of US to identify liver metastases during the first two years of follow-up of colorectal cancer.

**Methods/Interventions:** A retrospective study based on a prospective collected database was performed. All patients who underwent initial treatment for colorectal cancer with at least two years of follow-up between 2003 and 2016 were included. A thoracic, abdominal and pelvic CT scan was performed every six months adding an

abdominal US in between those periods for the first two years. Patients who had distant metastasis at initial presentation (stage IV) were excluded.

**Results/Outcome(s):** Of a total of 426 patients, 299 met the inclusion criteria and were recruited. 54 (5%) were males. Main age was 66.7 ( $\pm 12,2$ ) years. Ninety nine (33.1%) patients were classified as stage I; 93 (31.1%) as stage II; and 107 (35.8%) as stage III. Fifty (16.7%) patients had recurrences during follow up: 31 (62%) intraabdominal recurrences; 17 extraabdominal metastasis (34%); and 2 (4%) local recurrences. From those who had abdominal recurrences, 17 patients presented with liver metastasis: 5 (29.4%) diagnosed by US; 12 (70.6%) by CT scan. Eleven patients had resectable disease being 4 (36%) of them diagnosed by US.

**Conclusions/Discussion:** US could be a useful complementary method to identify liver metastases in the follow-up of colorectal cancer and it might be an effective tool to anticipate this diagnosis.

#### FOLLOW-UP FOR PATIENTS WITH STAGE I COLON CANCER. IS IT WORTHWHILE?

P573

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**Purpose/Background:** After primary treatment of colon cancer, 30 to 50% of patients will develop recurrence or will die as a result of the disease. The aim of the follow-up is to identify recurrences as early as possible. The incidence of recurrences in patients with stage I disease is very low. That is why the need and frequency of tests during follow

#### P571 Short-term (30-day) Outcomes by Laparoscopic Surgical Approach for Rectal Cancer

	Laparoscopic (n=495)	Laparoscopic with Planned Open Conversion (n=385)	Laparoscopic with Unplanned Open Conversion (n=128)	p
Mortality	1 (0.2%)	1 (0.3%)	0 (0%)	NS
Any Complication	69 (13.9%)	37 (9.6%)	27 (21.1%)	<0.05
Ileus	64 (12.9%)	65 (16.9%)	31 (24.2%)	<0.05
Infectious Complications	48 (9.7%)	42 (10.9%)	33 (25.8%)	<0.05
Pulmonary Complications	10 (2.0%)	11 (2.9%)	9 (7.0%)	<0.05
Cardiac Complications	2 (0.4%)	1 (0.3%)	5 (3.9%)	<0.05
Renal Complications	13 (2.6%)	10 (2.6%)	3 (2.3%)	NS
Urinary Tract Infection	19 (3.8%)	11 (2.9%)	7 (5.5%)	NS
Venous Thromboembolism	7 (1.4%)	2 (0.5%)	1 (0.8%)	NS
Anastomotic Leak	29 (5.9%)	21 (5.5%)	13 (10.2%)	NS
Mean (SD) Operative Time in Minutes	244 (45)	251 (5)	278 (9)	<0.05
Median (IQR) Postoperative Length of Stay in Days	5 (4-6)	5 (4-6)	6 (5-9)	<0.05
Readmission	55 (11.1%)	55 (14.3%)	17 (13.3%)	NS

up for this group of patients is questioned. The objective of this study was to analyze the effectiveness of the follow up in patients with stage I colon cancer.

**Methods/Interventions:** A retrospective study based on a prospective collected database was performed. All patients treated with stage I colon cancer according to TNM classification who have at least two years of follow up and completed at least 80% of the tests required between 2003 and 2016 were included. Patients with locoregional disease (stages I-III) are controlled every 3 months with clinical examination and CEA. Thoracic and abdominal CT scans are done at months 6, 12, 18 and 24; and abdominal ultrasound is performed at months 3, 9, 15 and 21 during the follow-up. After the second year, CEA and CT scans were performed annually. Colonoscopy is done one year after primary treatment, unless a preoperative incomplete study. In those cases, colonoscopy is done 6 months after surgery.

**Results/Outcome(s):** During the mentioned period, 426 patients were operated due to colon cancer. Of those, 99 patients met the inclusion criteria. Fifty three patients (53,5%) were male, with an average age of 66,3( $\pm$ 10,46) years. The main follow-up was 53,03 ( $\pm$ 29,70) months. Only one liver recurrence was diagnosed 6 months after surgery (recurrence rate 1%).

**Conclusions/Discussion:** The effectiveness of follow-up in patients with stage I disease is low, thus, either its indication or the frequency of studies should be rethought.

#### PREOPERATIVE LOCAL STAGING OF COLON CANCER USING COMPUTED TOMOGRAPHY SCAN. PRELIMINARY REPORT.

P574

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**Purpose/Background:** There is some evidence that locally advanced colon cancer might benefit from neoadjuvant therapy. While these evidences are confirmed, it would be important to identify which study has the best accuracy for local staging. Computed tomography (CT) is the study of choice to rule out extended disease, but little is known about its usefulness for local staging. The objective of this study was to determine the diagnostic accuracy of CT in preoperative staging of colon cancer using TNM criteria.

**Methods/Interventions:** A prospective study including patients undergoing primary resection of right and left colon cancer with CT pre-operative cTNM staging during the period between 2013 and 2016 was performed. Patients with presence of distant metastases at the diagnosis or with studies performed at other institutions were excluded. The CT staging protocol was performed on a 320-cuts tomograph Aquilion One, Toshiba medical systems, (Ohtawara,

Japan). The evaluation of cTNM at CT was performed independently by two radiologists, who were blinded each other and from the pathology report (gold standard). The accuracy for locally advanced colon cancer (T3-T4) and nodal metastases (N positive) was measure by calculating sensitivity (S), specificity (SP), positive (PPV) and negative predictive values (NPV). The inter-observer agreement was calculated using the kappa coefficient using the scale proposed by Landis and Koch.

**Results/Outcome(s):** Forty six studies were evaluated. 47% of the tumors were located in the right colon while 53% in the left. The S, SP, VPP and NPV to determine T and N were as follows: T3: S 55%, SP 100%, VPP100%, VPN56%; T4: S62%, PS 86%, VPP50%, VPN 91%. To define N positive: S68%, SP 63%, VPP50%, VPN79%. A sub-analysis was performed over T3-T4 together achieving a S of 100% (IC: 0.66-1), SP 70% (IC: 0.62-0.70), VPP 45% (CI: 0.30-0.45), VPN100 % (IC: 0.88-1). The kappa value for CT diagnosis of locally advanced colon cancer (T3-T4) was 0.49 (95% CI: 0.25-0.73) and lymph node metastases (N positive) 0.24 (95% CI: 0.06-0.42).

**Conclusions/Discussion:** Preliminary results from this study shows that CT would have a moderate to low diagnostic accuracy for preoperative staging of colon cancer. However, it could be better to distinguish the initial tumors from those locally advanced.

#### COMPARISON OF INITIATION OF ADJUVANT CHEMOTHERAPY AFTER ROBOTIC AND LAPAROSCOPIC COLON CANCER SURGERY: A CASE-CONTROLLED STUDY WITH PROPENSITY SCORE MATCHING.

P575

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**Purpose/Background:** Early initiation of adjuvant chemotherapy after colon cancer surgery has shown better oncologic outcomes in previous studies. However, clinical impact of robotic and laparoscopic surgery on the initiation of adjuvant chemotherapy has not been widely evaluated. The aim of this study was to compare the impact of robotic and laparoscopic surgery on the initiation of adjuvant chemotherapy after colon cancer surgery.

**Methods/Interventions:** From November, 2005 to September, 2016, 278 patients underwent curative robotic or laparoscopic surgery for stage II, III colon cancer. Twenty nine patients underwent robotic surgery and 249 patients underwent laparoscopic surgery. To control for different demographic factors in the two groups, propensity score case matching was used at a 1:4 ratio. Propensity scores were generated with the baseline characteristics, including age, sex, body mass index, American Society of Anesthesiologists (ASA) score, tumor location and pathologic stage. Finally, 145 patients were matched with 29

patients of the robotic surgery group and 116 patients of the laparoscopic surgery group.

**Results/Outcome(s):** The operation time was longer in the robotic group (311 vs. 191 min;  $P < 0.001$ ). However, conversion rate, number of retrieved lymph nodes, length of stay, postoperative complication rate, and Clavien-Dindo grade were not significantly different between robotic and laparoscopic groups. There was no difference in the time to initiation of adjuvant chemotherapy between two groups (29.6 vs. 30.1 days, respectively;  $P = 0.820$ ).

**Conclusions/Discussion:** Robotic and laparoscopic surgery showed no different impact on the initiation of adjuvant chemotherapy. This finding suggests that two surgical techniques offer similar postoperative recovery.

### LUMINAL MAPPING & DISTRIBUTION OF COLONIC ADENOCARCINOMAS AND ADENOMAS: A PROSPECTIVE OBSERVATIONAL STUDY.

P576

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**Purpose/Background:** The distribution of adenocarcinomas and adenomas of the colon has been studied on the basis of their anatomical (segmental) location. However there is a paucity of data regarding the luminal location of these lesions.

**Methods/Interventions:** Surgical specimens from consecutive patients who had a colonic resection were submitted for mapping the luminal location of the adenoma/adenocarcinoma by 2 attending surgeons/pathologist. Based on their luminal location, lesions were classified as mesenteric, anti-mesenteric, predominantly mesenteric, predominantly anti-mesenteric, or equal.

**Results/Outcome(s):** A total of 86 subjects were recruited, and the total number of lesions (adenomas and adenocarcinomas) was 122. There were 49 adenomas and 73 adenocarcinomas. The distribution of adenomas along the colon was as follows: right colon 34, transverse colon 5, left colon 3, and sigmoid colon 7, while the distribution of adenocarcinomas was right colon 39, transverse colon 5, left colon 7, and sigmoid colon 22. The luminal location of adenocarcinomas was as follows: mesenteric/mesenteric predominance 48 (66%) and anti-mesenteric/anti-mesenteric predominance 21 (29%). The luminal location of adenomas was as follows: mesenteric/mesenteric predominance 42 (86%) and anti-mesenteric/anti-mesenteric predominance 5 (10%).

**Conclusions/Discussion:** Luminal mapping of colonic adenomas and adenocarcinomas suggests a mesenteric bias. This may have important clinical implications impacting both diagnostic and therapeutic strategies. Further research is required to elucidate the mechanisms underlying this predilection.

### PLASMA MESOTHELIN AS A NOVEL DIAGNOSTIC AND PROGNOSTIC BIOMARKER IN COLORECTAL CANCER.

P577

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**Purpose/Background:** Colorectal cancer is the third most common malignant tumor, in terms of incidence around the world. However, nearly 25% patients with colorectal cancer were diagnosed advancing stage at the first time and the 5-year survival rate of colorectal cancer was estimated to be 62-64%. It is necessary to identify some new potential biomarkers, especially in plasma or serum, for the diagnosis of colorectal cancer and prediction

**P575 Perioperative results (After case matching)**

	Robotic (n = 29)	Laparoscopic (n = 116)	P value
Conversion, n (%)	0	6 (5.2)	0.600†
Operation time (min.) Mean (SD)	311 (97)	191 (58)	< 0.001
Retrieved lymph node Mean (SD)	26 (9)	29 (14)	0.229
Length of stay (day) Mean (SD)	10.9 (3.6)	10.8 (4.6)	0.873
Postoperative complication, n (%)	6 (20.7)	15 (12.9)	0.288
Clavien-Dindo Grade, n (%) I/II/III	3 (10.3)/3 (10.3)/0	5 (4.3)/9 (7.8)/1 (0.8)	0.675
Time to iniation of chemotherapy (day) Mean (SD)	29.6 (9.0)	30.1 (10.9)	0.820

† Fisher's exact test. SD, standard deviation.

of therapy. Mesothelin, a 40-kDa cell glycosylphosphatidylinositol (GPI)-linked protein, has been found in mesothelial cells lining the peritoneum, pleura and pericardium usually. The overexpressed mesothelin has been detected in many cancers. However, the potential value of mesothelin as plasma biomarkers in colorectal cancer has not been explored. The purpose of this study was to identify whether plasma mesothelin is a suitable diagnostic and prognostic biomarker for colorectal cancer.

**Methods/Interventions:** We performed a two-stage case-control study of 147 colorectal cancer cases and 121 healthy controls to evaluate plasma mesothelin levels in colorectal cancer by enzyme-linked immunosorbent assay (ELISA). Preoperative and postoperative plasmas of patients were collected to examine the level changes influenced by surgery. We also used receiver operating characteristic (ROC) curves and the area under the curve (AUC) to identify the diagnostic power of plasma mesothelin. Furthermore, patient survival analyses were conducted by Kaplan-Meier analyses and Cox regression models.

**Results/Outcome(s):** In this study, we investigated the level of mesothelin in plasma in a two-stage case-control study and evaluated the diagnosis and prognosis value of colorectal cancer patients with high mesothelin level. Combined the results in stage 1 and stage 2, we obtained the consistent results that colorectal cancer patients secreted more mesothelin in plasma than cancer-free controls (cases, median level = 34.68 ng/ml; controls, median level = 25.65 ng/ml;  $P < 0.001$ ). Moreover, we found that mesothelin levels in group of Duke's stage C and D were obviously higher than the group of Duke's stage A and B ( $P < 0.001$ ). In addition, we found that plasma mesothelin in colorectal cancer patients were significantly higher than that in the controls ( $P < 0.001$ ) with an AUC value of 0.690 (95% CI = 0.625 to 0.752). Individuals with lower mesothelin level had a longer survival time (adjusted HR = 4.43, 95% CI = 1.93-10.15,  $P < 0.001$ ). Furthermore, Patients had slightly decreased mesothelin levels in postoperative plasma than preoperative plasma, although the alteration was not significant ( $P = 0.052$ ).

**Conclusions/Discussion:** Our results provided the evidence that plasma mesothelin level was associated with development and prognosis of colorectal cancer, which may be a potential diagnosis and prognosis biomarker for colorectal cancer.

#### PELVIC EXENTERATION IN PATIENTS WITH RESECTABLE VISCERAL METASTATIC DISEASE.

P578

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**Purpose/Background:** 8-30% of patients with locally advanced rectal cancer develop metastatic disease.

Untreated 5-year survival rates are less than 5%. With curative resection of liver and lung metastases, 5-year survival rates can improve to 25-35%. Pelvic exenteration is the only curative treatment option for patients with locally advanced primary or recurrent rectal cancer. There is limited published data on the outcomes of pelvic exenteration and resection of visceral metastases.

**Methods/Interventions:** A retrospective review of a prospective database was performed from January 1994 to present. The inclusion criteria were patients who underwent pelvic exenteration for primary or recurrent rectal cancer with resectable metastatic disease. The primary endpoint was 5-year disease free survival. Secondary endpoints were local recurrence, morbidity and mortality.

**Results/Outcome(s):** 299 patients out of 498 underwent pelvic exenteration for primary or recurrent rectal cancer. 15 patients had resectable visceral metastases at the time of diagnosis. The median follow up was 29 months. No patients were lost to follow up. Overall median survival was 29 months, with a 5-year disease-free survival of 50%. 5 patients died during the study period due to cardiorespiratory disease with only 1 patient developing recurrence of liver metastases 4 months after surgery.

**Conclusions/Discussion:** Pelvic exenteration with resection of visceral metastases may produce favorable outcomes. More extensive analysis with a larger multicenter study population is required in this small population of patients. Our review demonstrated a median survival of 29 months, which is significantly higher than published data for those treated non-operatively by chemotherapy or chemoradiotherapy.

#### ADC VALUE OF TUMOR IN RECTAL CANCER BY DIFFUSION-WEIGHTED MRI.

P579

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**Purpose/Background:** Imaging analysis has been dramatically improved and used for the diagnosis of several malignant tumors, however, its usefulness remains unproved for oncological characterization. Apparent diffusion coefficient (ADC) value by diffusion-weighted MRI could evaluate cell congestion in the tissue by demonstrating relative movement of water molecules in the intracellular space. Recently, ADC value is suggested to correlate with the malignant potential in ovarian or renal cancer. In this current study, we attempted to clarify the significance of ADC value on rectal cancer.

**Methods/Interventions:** We enrolled 126 patients who had undergone anterior resection for rectal cancer with curative intention in our hospital from January, 2006 to March, 2016 and had available results of preoperative MRI. We built ADC-map from their diffusion-weighted



MRI, randomly selected three horizontal images in tumor, and measured ADC value in the regions of interest surrounding each tumor. The patients were divided into two groups by the average of ADC value and their clinicopathological background factors or long-term outcomes were compared statistically.

**Results/Outcome(s):** In the 126 cases of this study, the mean ADC value of tumor (mean±standard deviation) was  $(1.24\pm 0.16)\times 10^{-3}$ . Lower ADC group includes 55 patients and significantly more number of patients with T2-4 locally advanced cancer ( $p=0.031$ ) or lymphatic invasion ( $p=0.028$ ). No difference was observed in the other factors including the number of lymph nodes metastasis, preoperative tumor marker (CEA, CA19-9), vascular invasion and histological type between the two groups. The median observational period was 39.6 months. Recurrence was observed in 17 patients; 5 local recurrences and 12 distant metastases (i.e. liver, lung, brain, and bone). Univariate analysis of recurrence free survival by Cox proportional hazard models revealed significantly worse outcome in lower ADC value group (Hazard ratio: 3.07,  $p=0.013$ ). Multivariate analysis adjusted with CEA, pathological lymph node metastasis and lymphatic invasion revealed that lower ADC value tended to be a poor prognostic factor (Hazard ratio: 2.42,  $p=0.068$ ). However, no correlation was observed in cancer related survival ( $p=0.792$ ).

**Conclusions/Discussion:** ADC value of tumor by diffusion-weighted MRI might be a prognostic factor for rectal cancer though further investigation is required.

#### FACTORS ASSOCIATED WITH 30-DAY READMISSION AFTER LAPAROSCOPIC RECTAL SURGERY WITHIN AN ENHANCED RECOVERY PATHWAY.

P580

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**Purpose/Background:** Hospital re-admission within 30 days of surgery has been identified as a marker of poor outcome. Aim of the present study is to identify risk factors associated with 30-day readmission following laparoscopic rectal cancer surgery within an enhanced recovery after surgery (ERAS) pathway

**Methods/Interventions:** 260 consecutive patients with histologically documented rectal cancer, who underwent laparoscopic rectal resection in compliance with an ERAS pathway over a 7 year period in a single institution were retrospectively evaluated. Data were collected relating to patient demographic, co-morbidity on admission, ASA score, Body Mass Index, neoadjuvant chemotherapy, operative and postoperative variables including compliance with ERAS items. A logistic regression model was used to identify factors associated with readmissions. Sensitivity analysis of non-emergent admission was also conducted

**Results/Outcome(s):** Overall compliance to ERAS protocol was 86.7 %. Median (range) of hospital stay was 6 (3-52) days. Readmission occurred in 24 patients (9.2%). Causes of re-admission were as follow: bowel obstruction (n=7), ostomy dysfunction (n=2), anastomotic leak (n=6), wound infection (n=6), pneumonia (n=2) and anastomotic bleeding (n=1). Age < 65 years old (odds ratio 5, 6; 95% CI 1.2-26.3;  $p=0.03$ ), severe postoperative complications including Clavien-Dindo class 3b-5 (odds-ratio 4.42; 95% CI 2.62-76.8;  $p=0.002$ ), low (< 70%) compliance of ERAS protocol (odds ratio 4.2; 95% CI: 1.13-17.17;  $p=0.05$ ) were independent predictors of readmission at the multivariate analysis.

**Conclusions/Discussion:** ERAS protocol could be safely applied to rectal cancer patients without jeopardize 30-day readmission rate. Poor adherence to ERAS protocol, age < 65 and major postoperative complications were independent predictors of readmission after laparoscopic surgery for rectal cancer. These findings highlight the need to further expand the scope of the ERAS pathway beyond hospital discharge.

#### COMPARING STANDARD COLONOSCOPY TO ENDOCUFF VISION ASSISTED COLONOSCOPY: A RANDOMIZED CONTROL TRIAL WITH VIDEO ANALYSIS.

P581

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**Purpose/Background:** Capped devices have been available for to enhance colonoscopy. Endocuff vision is a second generation device that is fitted at the end of the colonoscope. This device has tentacle-like arms that remain retracted on advancing the colonoscope. On withdrawal the arms wing out to spread the folds of the colon. This assists in looking behind folds of the colon and identifying hidden polyps and improving the adenoma and polyp detection rate. Higher adenoma detection rate is associated with lower interval adenoma and colorectal carcinoma rate. The primary outcome of the study is to prove an improved adenoma detection rate with the endocuff vision device. Secondary outcomes include a video analysis looking specifically at the efficiency of withdrawal, looking particularly at the "red-out" rate - which is where vision is lost during withdrawal of the scope coming into contact with the wall of the colon. Anecdotally it has been difficult to intubate the terminal ileum, completion either into the terminal ileum or cecum will be assessed.

**Methods/Interventions:** A power calculation based on the first generation device endocuff vision which showed a 12% increase in the adenoma detection rate. To prove a difference 209 scopes were required in each arm with a target of 418 scopes. The patients were block randomized per colonoscopy list either into standard colonoscopy or

endocuff vision assisted colonoscopy. The first 50 of each arm were recorded for video analysis. All patients that presented for colonoscopy were considered eligible for the trial. Patients were excluded if they had a prior colonic resection, known stricture from inflammatory bowel or diverticular disease or if an obstructing cancer found during examination.

**Results/Outcome(s):** Results are still pending. The study has currently recruited 300 patients and is expected to be completed in January 2017. We are expecting the trial to be completed with statistical analysis by the time of ASCRS meeting in June 2017.

**Conclusions/Discussion:** We expect the endocuff vision capped colonoscopy device to show an improved adenoma detection rate compared to standard colonoscopy. We also expect the device to show an improved efficiency in withdrawal on video analysis. Capped devices should be used routinely for screening colonoscopy.

**MODELLED DECISION ANALYSIS DOES NOT SUPPORT ROUTINE FORMATION OF A DEFUNCTIONING STOMA IN LOW ANTERIOR RESECTION.**

P582

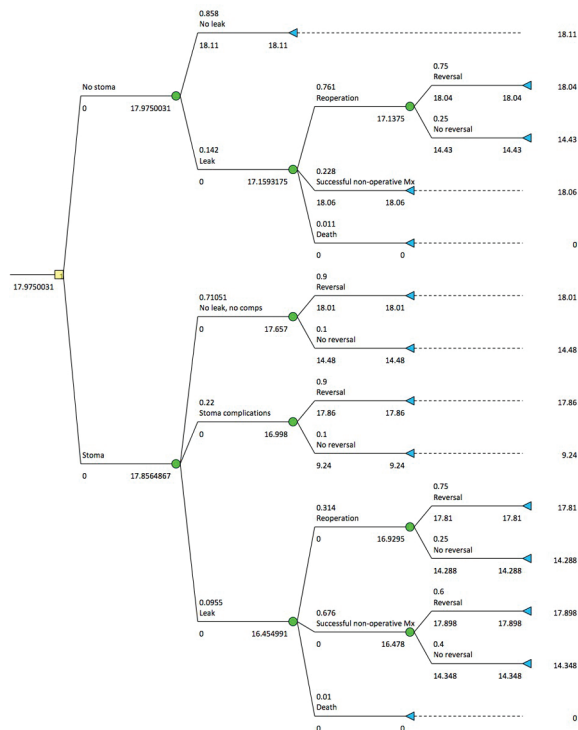
E. MacDermid, C. Young, S. Moug, R. Anderson  
 Baulkham Hills, NSW, Australia; Camperdown, NSW, Australia; Paisley, United Kingdom

**Purpose/Background:** Formation of a defunctioning stoma after low anterior resection has been shown in meta-analysis to reduce both the incidence of anastomotic leak, and need for reoperation [1]. However, defunctioning stomas are associated with their own incidence of complications and invariably need further surgery. Modelled decision analysis is a quantitative method of examining different choices such as these made under uncertainty. This study examines a modelled decision analysis of the choice whether or not to defunction after low anterior resection.

**Methods/Interventions:** The base case is that of a healthy 65 year-old man undergoing low anterior resection for a rectal cancer with curative intent. A decision-tree was constructed using TreePlan™ software. Incidence of anastomotic leak (0.1 with defunctioning stoma, 0.14 without), stomas complications (0.22), reoperation and death were obtained from previously published meta-analysis [1]. Risk of permanent stoma after leakage and reoperation (0.25) was obtained from a large case-series [2]. Utilities of different patient outcomes were obtained from a previous questionnaire of colorectal surgeons from the British Isles. Projected life expectancy was obtained from life tables. Two-way testing was performed to assess and test for variable sensitivity, including incidence of anastomotic leak with and without a stoma, and incidence of stoma complications.

**Results/Outcome(s):** Omission of a defunctioning stoma after low anterior resection gives a better total QUALY outcome (17.98 vs 17.86 QUALYs) for the base-case patient. On two-way testing of variables it was demonstrated that once the incidence of anastomotic leak *without* defunctioning stoma reaches 24%, or the incidence of complications from stoma formation is 16% or less, routine stoma formation becomes optimal.

**Conclusions/Discussion:** Modelled decision analysis does not support routine formation of a defunctioning stoma after low anterior resection. The incidence of anastomotic leak at which stoma formation becomes optimal appears to be 24%. Our previous work showed that most colorectal surgeons would deem this to be an unacceptably high risk. As our decision analysis was modelled on patient utility values provided by surgeons themselves it would appear that other unrecognised heuristic factors exert a bias on this decision. 1. Tan et al (2009) Meta-analysis of defunctioning stomas in low anterior resection for rectal cancer. Br J Surg, 96: 462–472. doi:10.1002/bjs.6594 2. Matthiessen et al (2004) Risk factors for anastomotic leakage after anterior resection of the rectum. Colorectal Disease 6: 462 – 469.



Decision tree showing risks and utilities of various patient outcomes after low anterior resection of the rectum.

## OBSERVATION OF “COMPLETE CLINICAL RESPONSE” IN RECTAL CANCER.

P583

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**Purpose/Background:** When a rectal cancer disappears after a long course of chemo/radiotherapy the possibility of observation alone is raised. We report the results of a single centre’s experience of observation with strict surveillance.

**Methods/Interventions:** This is an ongoing single-centre prospective cohort and follow up of all consecutive rectal cancer patients deemed to have had a complete clinical response (cCR) after long course neoadjuvant chemoradiotherapy (CRT) managed by a ‘watch and wait’ approach at Flinders Medical Centre from 2010. Patients were assessed at 10-weeks with clinical examination, flexible sigmoidoscopy (+ biopsies) and MRI. Patients without any clinically obvious residual tumour were observed with strict follow-up. They were referred to 3-6 monthly follow-up visits for repeat clinical examinations and flexible sigmoidoscopy with biopsies (when feasible). MRI pelvis (+DWI) was repeated every 6-months. All patients were made aware about the non-standard nature of this approach with extensive discussion about the risks and benefits.

**Results/Outcome(s):** 37 patients were observed. Mean age was 61.06-years. T2 – 8, T3 – 23, T4 – 2; N0 – 6, N1 – 16, N2 – 10; M1 – 5. 25 patients sustained a cCR over a median follow up of 24.3-months (range 4.4-69.5). 1 of these had metastatic disease at presentation and maintained stable disease, while the remaining 24 of 32 (75%) with locally advanced cancers are all currently still alive with no further residual disease. There were 11 local re-growths, three of which occurred in patients with metastatic disease at initial staging. Mean time to detection was 16.5-months. Nine underwent salvage procedures (6 ULAR, 2 LAR; 1 APR), and one declined surgery and underwent a local excision. 9 of these patients have had no local or systemic recurrence after a mean of 15.3 months follow-up. Two of these patients also had metastatic disease at presentation. One patient with locally advanced disease developed combined local and systemic recurrence that was amenable to further surgery. They required a defunctioning ileostomy together with systemic chemotherapy. A further patient developed isolated non-resectable lung metastases without any evidence of local disease. There didn’t appear to be any significant differences in terms of age, gender distribution, tumour size estimation, depth of invasion, lymph node status, and disease stage between those with and without local re-growths. Our local and systemic recurrence rate in those with locally advanced disease is 3.3% and 6.25% respectively.

**Conclusions/Discussion:** The study has reproduced results of other prospective cohort trials on watch and wait, in particular that a strict selection criteria, up-to-date

imaging and follow up is safe and feasible with the great majority of local re-growths salvageable with a systemic recurrence rate within 10% - comparable to that reported for patients with a complete pathological response.

## INCIDENCE RATE AND HIGH-RISK FACTORS FOR RECTOVAGINAL FISTULA AFTER LOW ANTERIOR RESECTION IN CHINESE PATIENTS WITH COLORECTAL CANCER.

P584

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**Purpose/Background:** Rectovaginal fistula (RVF) is a postoperative complication of low anterior resection (LAR). However, very few cases of post-LAR RVF have been reported.

**Methods/Interventions:** To determine post-LAR RVF incidence, high-risk factors, and optimal treatment methods. Female patients (n=1493) who underwent LAR for colorectal cancer between January 2006 and March 2016 were included. We calculated the incidence of post-LAR RVF and performed univariate and multivariate logistic regression analyses of high-risk factors. Various treatment methods and corresponding fistula healing conditions were analyzed.

**Results/Outcome(s):** The incidence of post-LAR RVF was 1.61%. RVF occurred 3–1,161 days after surgery (median 19.5 days). Univariate analysis revealed the following significant high-risk factors: distance of the lower tumor margin from the anus ( $p<0.001$ ), surgery duration ( $p=0.009$ ), unsatisfactory anastomosis ( $p<0.001$ ), and heavy intraoperative blood loss ( $p=0.002$ ). Multivariate analysis showed that only the distance of the lower tumor margin from the anus (hazard ratio [HR] 0.650, 95% confidence interval [CI] 0.496-0.851,  $p=0.002$ ) and unsatisfactory anastomosis (HR 6.474, 95% CI 2.236-18.743,  $p=0.001$ ) were related to RVF occurrence. After RVF occurrence, 24 patients were followed-up for 228–3,733 days (median 1,774 days). Currently, 16 patients (66.7%) have healed. The healing time range was 30–1,225 days (median 210 days). After the occurrence of anastomotic leakage, 21 patients underwent fistula bypass surgery, of which, 71.4% (15/21) recovered after ostomy.

**Conclusions/Discussion:** The main high-risk factors for post-LAR RVF are tumors near the anus and unsatisfactory anastomosis. Once RVF occurs, we recommend performing colostomy bypass surgery. These findings can help reduce RVF occurrence and improve treatment outcomes.

**THE PREDICTIVE FACTOR OF COMPLICATIONS AFTER COLORECTAL CANCER SURGERY USING THE CART : CLASSIFICATION AND REGRESSION TREES METHOD.**

P586

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**Purpose/Background:** Complications after colorectal cancer (CRC) surgery are still critical issues and require for earlier diagnosis and treatment. Tree structured method represented by CART (Classification And Regression Trees), is a useful method to classify the population with higher rate of events by optimal cutpoints of decision tree, which is easy to interpret and has a good predictive power. In this study, we attempted to make decision trees with postoperative blood test for predicting complications after CRC surgery by using CART methods and validate it for the other data-set.

**Methods/Interventions:** Postoperative blood test results (WBC : White Blood Cell, Hb : Hemoglobin, Plt : Platelets, TP : Total Protein, CRP : C-Reactive Protein) on 1 or 3 postoperative day (POD) were collected from 734 patients with CRC who had undergone curative resection in our institute from 2005 to 2011 and used for making the decision tree for predicting postoperative complications by CART methods using R software. Sequentially, the validation study for the decision tree was performed in 111 patients with CRC who had undergone curative surgery from Oct 2014 to June 2015 in our institute.

**Results/Outcome(s):** CART methods successfully established the optimal decision tree in which the patients with  $CRP > 16.41 \text{ mg/dl}$  as well as  $Plt \% 248 \times 10^4 \mu\text{l}$  on 3POD showed significantly higher risk of postoperative complications (Odds ratio :  $8.379 \pm 6.125$ ,  $p = 0.004$ ) compared to the others. In the validation study, the patients were divided into high or low risk groups following these cut points, and their clinicopathological backgrounds or short-term surgical outcome were compared. The high risk group consisted of 10 patients For clinicopathological backgrounds, no difference was observed except for laparoscopic surgery (60 vs 86%,  $p = 0.032$ ). With respect of surgical outcome, operation time (356 vs 270min,  $p = 0.014$ ), bleeding (381 vs 10,  $p < 0.001$ ), and the length of stay (14 vs 7days,  $p = 0.002$ ) were significantly favorable in the low risk group. The high risk group showed 7 patients (70%) with postoperative complications over Grade 1 in Clavien-Dindo classification, which was significantly greater compared to 22 patients (22.8%) in the low risk group ( $p = 0.0010$ ). Multivariate analysis adjusted with age, sex, Performance Status, operation time, bleeding, and laparoscopic surgery revealed that the high risk group was an independent risk group for complications after colorectal cancer surgery (Odds Ratio: 6.143 95% CI: 1.249-30.22,  $p = 0.026$ ).

**Conclusions/Discussion:** The decision tree by CRP and Plt on 3POD, which was obtained from CART methods, might be feasible for predicting postoperative complications in CRC surgery.

**MRI STAGING OF RECTAL CANCER: PROFORMA USE IMPROVES COMPLETENESS OF REPORTS.**

P587

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**Purpose/Background:** Magnetic resonance scanning is the gold standard imaging technique for local staging of rectal cancers. It is imperative that key information is included within the MRI report to guide management decisions. Based on previous research in histopathology we believe a proforma will aid in the completeness of MRI reporting.

**Methods/Interventions:** 100 patients over a 16 month period were retrospectively reviewed, all had MRIs for primary rectal cancers. 50 were reported with proformas and 50 by free text. Comparison of the information reported was then made between the 2 groups to ascertain completeness of reports. Reports were said to be complete when all of the key information deemed necessary by the European Society of Gastrointestinal and Adominal Radiologists (ESGAR) had been included. Chi squared test was used to ascertain whether there

**Results/Outcome(s):** 6% of reports reported in free text were complete compared to 98% of proforma reports showing a clear difference ( $\chi^2 = 84.776$ ,  $p = < 0.001$ ).

**Conclusions/Discussion:** The use of a proforma improves completeness of reporting in MRIs for primary rectal malignancy and should be considered in all units undertaking treatment of rectal malignancy

**DEVELOPMENT AND VALIDATION OF A PREDICTION MODEL FOR ANASTOMOTIC LEAKAGE RISK IN LAPAROSCOPIC LOW ANTERIOR RESECTION: A DECISION MAKING TOOL FOR PROTECTIVE STOMA.**

P588

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**Purpose/Background:** A protective stoma may reduce the risk of clinical anastomotic leakage after laparoscopic low anterior resection, but this is overtreatment for most patients. More accurate predictive tool of anastomotic leakage would be helpful for tailoring stoma creation. We aimed to identify the predictive factors of anastomotic leakage and develop a prediction model to calculate

anastomotic leakage risk during the operation in laparoscopic low anterior resection for rectal cancer.

**Methods/Interventions:** Between 2005 and 2012, 666 rectal cancer patients who underwent laparoscopic low anterior resection with double-stapled anastomosis and without protective stoma, were included in this study. A prediction model was constructed based on the probability risk score and was validated for 188 patients collected from 2013 to August 2014.

**Results/Outcome(s):** Anastomotic leakage rate was noted in 62 patients (9.3%). Male, preoperative chemoradiation, clinical advanced tumor stage, multiple firings of the linear stapler, and the lower location of anastomosis were used in this prediction model. When applying this model, anastomotic leakage was predicted in 216 patients (32.4%) and actual anastomotic leakage occurred in 45 patients (6.8%). It can translate that if we make 32.4% of protective stoma, clinical anastomotic leakage can be reduced from 9.3% to 2.5%. The predictive accuracy of this model was 71.8% (sensitivity, 72.6%; specificity, 71.7%). On the validating this model in difference treatment period, the predictive accuracy was 70.2% (sensitivity, 66.7%; specificity, 70.4%).

**Conclusions/Discussion:** A Prediction model for anastomotic leakage risk may be a valuable decision making tool that can help surgeons reliably identify patients at high risk for anastomotic leakage. Further large cohort study would be required to generalize this single-center study.

**AL risk score (Probability of AL)**

$$= \frac{\exp(1.095 - 1.872 \times X_1 + 0.271 \times X_2 + 0.960 \times X_3 + 0.537 \times X_4 - 0.608 \times X_5)}{1 + \exp(1.095 - 1.872 \times X_1 + 0.271 \times X_2 + 0.960 \times X_3 + 0.537 \times X_4 - 0.608 \times X_5)}$$

- $X_1$ : Gender (Male : 0, Female : 1)
- $X_2$ : Preoperative CRT (No : 0, Yes : 1)
- $X_3$ : Clinical T stage (T1/T2 : 0, T3/T4 : 1)
- $X_4$ : Number of linear staplers (number)
- $X_5$ : Location of anastomosis (cm)

※ AL risk score : from 0 to 1

## MANAGEMENT OF GASTRIC ADENOMAS IN PATIENTS WITH FAMILIAL ADENOMATOUS POLYPOSIS.

P589

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**Purpose/Background:** Patients with familial adenomatous polyposis (FAP) are known to have a higher risk of developing gastric adenomas. There is limited understanding of their clinical course and no consensus on surveillance and management. We reviewed the management of gastric adenomas in patients with FAP from St. Mark's Hospital.

**Methods/Interventions:** A retrospective search of the FAP registry database and endoscopy reports identified 45 patients (27 male) with gastric adenoma. Patient records, and histopathology reports were evaluated.

**Results/Outcome(s):** Forty-five patients were diagnosed with adenoma; one of these was upgraded to cancer on further immunohistochemical assessment and has been excluded from further analysis. The median age at diagnosis was 47 years (range 43-80) with a mean follow up of 18 months (range 1-123). Of the gastric adenomas, twenty-one (48%) were located in the antrum. Twelve (39%) were <5mm in size, thirteen (42%) between 5-20mm and six (19%) >20mm. Twenty adenomas (45%) demonstrated multiplicity whilst twenty-four (55%) were single. Three (7%) contained high-grade dysplasia and were between 7-50mm in size. Sixteen patients (36%) with gastric adenomas also had desmoid disease. Thirteen patients (30%) underwent EMR, four (9%) had ESD and one (2%) had cold biopsy removal. Two patients were admitted for complications - one for bleeding, requiring repeat endoscopy and one for analgesia. There was no evidence of adenoma recurrence in those who underwent endoscopic resection. Twenty-five patients (57%) continue on surveillance or are awaiting intervention and one patient was lost to follow up.

**Conclusions/Discussion:** Endoscopic surveillance and resection of gastric adenomas appears to be safe with a low incidence of recurrence. Gastric adenomas seem to be distributed equally proximal and distal to incisura. Further investigation is required to confirm whether the known association between gastric adenomas and desmoid disease represents a truly independent association, or whether it simply reflects the site of the germline mutation.

## DEHYDRATED HUMAN AMNION CHORION MEMBRANE IN COLORECTAL ANASTOMOSES.

P590

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**Purpose/Background:** Anastomotic leaks following colorectal surgery represent a significant postoperative complication with devastating if not lethal consequences. This complication is associated with severe morbidity and mortality. Large patient series have demonstrated that this event can occur in as much as 7% of colon anastomosis surgeries. Although there is much literature regarding the risks factors and consequence of this complications, few attempt have been using adjunct techniques to ameliorate this problem. The aim of this study was to evaluate the use of dehydrated human amnion and chorion membrane (dHACM) to reduce the incidence of this complication.

**Methods/Interventions:** A systematic review was made of a single surgeon's experiences utilizing dHACM to wrap his colonic anastomoses at the time of primary surgical

repair. Seventy four of patients underwent colonic resections with anastomoses wrapped in dHACM. The leak rate was then compared to the surgeon's historic leak rate prior to the use of dHACM.

**Results/Outcome(s):** Approximately 20 patients developed anastomotic leak in over 400 surgeries prior to the adoption of dHACM wrapping of the anastomosis for an estimated leak rate of 5.0%. One of patient developed anastomotic leak in seventy-four of surgeries where dHACM wrapping of the anastomosis was used for a leak rate of 1.35%.

**Conclusions/Discussion:** dHACM appears to significantly reduce the number of anastomotic leaks in colon resection surgery and can therefore reduce the prolonged length of stay and/or the need for readmission in these patients.

#### NEOADJUVANT CHEMORADIATION MAY WORSEN RECTAL CANCER INTRATUMORAL HETEROGENEITY AMONG PATIENTS WHO DEVELOP INCOMPLETE RESPONSE TO TREATMENT.

P591

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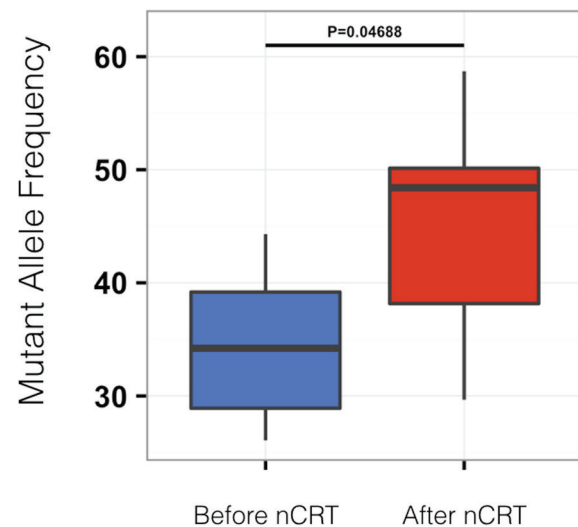
**Purpose/Background:** Neoadjuvant chemoradiation (nCRT) may result in incomplete tumor regression in a significant proportion of patients. Unresponsive tumors are considered to be associated with worse oncological outcomes when compared to those that develop complete response. The presence of distinct subpopulations of cancer cells within a single rectal cancer (intratumoral heterogeneity) may play a key role in tumor resistance to treatment modalities. The aim of this study was to compare the grade of intratumoral heterogeneity (ITH) among rectal cancer prior to and after nCRT among patients with incomplete response to therapy.

**Methods/Interventions:** Consecutive patients with cT3N0-1M0 undergoing nCRT (54Gy and concomitant 5FU-based chemotherapy) were eligible for the study. Patients with incomplete response after 12 weeks from nCRT completion were managed by radical surgery. Fragments from pre-treatment biopsies and post-CRT residual cancer were collected, snap-frozen and underwent whole-exome sequencing and mutation detection analysis using SOLiD 5500xl System. ITH in pre-treatment tumor biopsies were compared to post-treatment tumor fragments using mutant allele frequency (MAF) scores.

**Results/Outcome(s):** Seven consecutive patients with incomplete response to nCRT were included. MAF scores were significantly higher in post-treatment tumor

fragments in 6/7 patients (86%) when compared to their corresponding pre-treatment tumor fragments counterparts. Among all of these 6 patients, residual cancers showed poor tumor regression grade ( $\geq 80\%$  cancer cells and minimal fibrosis). Only one patient showed similar MAF scores between post-treatment and pre-treatment tumor samples. This patient showed significant tumor regression ( $<30\%$  cancer cells with considerable fibrosis).

**Conclusions/Discussion:** Tumors that develop poor response to nCRT may result in residual cancer cells with more intratumoral heterogeneity when compared to the primary cancer at baseline. In the setting of poor response to nCRT and increased intratumoral heterogeneity, nCRT may be potentially detrimental to the biology of these cancers.



Mutant allele frequency scores were significantly higher in post-treatment tumor fragments when compared to their corresponding pre-treatment tumor biopsies.

#### A SYSTEMATIC REVIEW OF THE QUALITY AND READABILITY OF WEB-BASED PATIENT EDUCATION MATERIALS ON COLORECTAL CANCER.

P592

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**Purpose/Background:** Australia has one of the highest rates of colorectal cancer in the world. Patients are increasingly using the internet to access health-related information. However, the literacy skills of almost half of all Australians aged 15-74 years are below the minimum level required to cope with the demands of a knowledge society. The aim of this study is to assess the readability and quality of patient-orientated internet information on colorectal cancer.

**Methods/Interventions:** The top three search engines (Google, Yahoo and Bing) were searched for the terms

“colon cancer”, “bowel cancer” and “rectal cancer” from an Australian based IP address. The top 50 sites per search engine were analysed. Readability was assessed using the Flesch-Kincaid (F-K) grade level, Gunning-Fog Index (GFI), Simple Measure of Gobbledygook (SMOG) index and the Flesch-Kincaid Reading Ease (FKRE) score. The LIDA tool and DISCERN instrument were used to assess the design and content of websites.

**Results/Outcome(s):** The median readability scores, reported as US school grade level, were 8.7 (F-K), 10.75 (GFI), 10.8 (SMOG) and 11 (FKRE). The quality of the websites was assessed as being good (median DISCERN score 51.5). Using the LIDA tool the usability was reasonable (80%), however reliability was poor (44%).

**Conclusions/Discussion:** The American Medical Association states that health-related materials for patients should be written at a level appropriate for those in the sixth-grade or below. Our findings indicate that web-based patient information on colorectal cancer is written above recommended reading levels and contains information that is unreliable. Better websites are required to engage a broader cohort of patients who may seek information on colorectal cancer on the internet.

#### CHARACTERISTICS AND OUTCOMES OF ANAL CANCER IN HIV INFECTED AND UNINFECTED INDIVIDUALS ATTENDING A SAFETY NET HEALTH SYSTEM: REVIEW OF 5 YEARS OF DATA.

P593

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**Purpose/Background:** The incidence of anal cancer has been increasing by 2.2% annually over the last decade compared to prior decades. This rise has been attributed to the increasing number of HIV and organ transplant recipients since it is suspected that immunosuppression augments the development of anal squamous cell dysplasia. The estimated incidence in HIV positive men who have sex with men (MSM) is 78 per 100,000 compared to 1.8 per 100,000 in the general population. Recently there has been more emphasis on screening methods and earlier detection of anal cancers since early detection dramatically improves survival. However, there is limited data on the outcomes of HIV positive patients compared to HIV negative patients. The aim of this study is to determine if there is a difference between HIV patients and non-HIV patients with anal cancer in terms of demographics, treatment, and outcomes.

**Methods/Interventions:** A retrospective chart review was performed for all patients with anal cancer at Parkland Health & Hospital System (Dallas, TX) from 2008-2013. Chi-squared test, t-test, and binomial test were used to calculate statistics.

**Results/Outcome(s):** 101 patients were identified with anal cancer from 2008-2013. 47 patients had HIV and 54 patients were HIV negative. The average CD4 count was 289 in HIV positive patients. The majority of HIV positive patients were men (95.7%) versus the HIV negative population which was 44.4% male ( $p < 0.0001$ ) similar to the gender prevalence of anal cancer in the general population which is more often seen in women than men. HIV positive patients were also younger (47 years old vs. 53 years old,  $p < 0.0006$ ). The HIV positive patients were also more likely to have other sexually transmitted diseases (31.9% vs. 1.9%,  $p < 0.0001$ ), condylomas (72.3% vs. 32.1%,  $p < 0.0001$ ), and other types of cancers (36.2% vs. 13.0%,  $p < 0.006$ ). The TNM stage was similar at presentation and the subsequent treatment was also similar. Mortality was higher in the HIV positive cohort (27.7% vs. 18.9%), but persistent or recurrent disease rates were similar.

**Conclusions/Discussion:** The incidence of anal cancer is rising, especially in the HIV positive MSM population. Our study revealed that these patients present at an earlier age and are more likely to have other cancers, but are similar with respect to stage at presentation, treatment, and outcome compared to HIV negative patients in the same time period.

#### THE CONCEPT OF THE “SURGICAL COLON”: A MAJOR BENEFIT OF SCREENING COLONOSCOPY.

P594

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**Purpose/Background:** Routine colonoscopic screening for colorectal cancer offers twin benefits of cancer prevention via endoscopic removal of premalignant polyps and decreased cancer mortality by finding malignant tumors at an early, presymptomatic stage. We propose a third, novel benefit of screening colonoscopy that should be considered in evaluation of its efficacy: the prevention of colonic resection itself for large, advanced, or multiple adenomas by finding these lesions while they remain endoscopically manageable. Colectomy is daunting to most patients and carries considerable morbidity. We hypothesize that minimizing the need for colectomy for benign, pre-malignant lesions is a major benefit of screening colonoscopy.

**Methods/Interventions:** A prospectively maintained database of average-risk patients who underwent routine screening colonoscopy was retrospectively examined. Exams for symptoms or personal or family history of neoplasia were excluded. Findings at index colonoscopy were recorded, as well as the ultimate endpoint of colectomy. From an analysis of patients referred by endoscopists to colorectal surgery, we derived definition of the “surgical colon” as meeting any of criteria: benign polyps  $\geq 40$ mm diameter, sessile serrated adenoma/polyp (SSA/P)  $>20$ mm,

any polyp with high grade dysplasia (HGD),  $\geq 5$  synchronous adenomas or sessile serrated polyps. Cancers found during screening were also recorded. Secondary endpoints recorded included advanced adenoma detection rate, adenoma detection rate, SSA/P detection rate, and sessile serrated polyposis.

**Results/Outcome(s):** 1545 patients underwent an index screening colonoscopy. Of these, 89 had missing reports and 14 (1%) had incomplete colonoscopies. 1442 patients were included for analysis. There were 711 men and 731 women; median age was 59 years. Adenoma detection rate was 34% overall, 43% in men and 25% in women. Advanced adenoma detection rate was 8.5% overall, 12% in men and 5.4% in women. SSA/P detection rate was 8.5% overall, 7.9% in men and 9.1% in women. Four cases of sessile polyposis syndrome were diagnosed. There were 6 cancers found: 3 colon cancers that were referred for surgery and 1 rectal adenocarcinoma and 2 rectal carcinoids that were all treated endoscopically. Sixty patients (4.2%) had high risk lesions likely to be referred for surgical evaluation and potentially requiring resection (see table); only 1 underwent surgical resection.

**Conclusions/Discussion:** Conclusion: "Surgical colon" was found in 4.2% of average risk patients undergoing screening colonoscopy, 10 times more frequently than cancers. Early and dutiful adherence to screening may help avoid colectomy for benign pre-malignant lesions in these asymptomatic patients, and represents a significant benefit of colonoscopy.

**TUMOR DEPOSITS AS PROGNOSTIC FACTOR IN COLORECTAL CANCER WITH REGIONAL LYMPH NODE METASTASIS.**

P595

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**Purpose/Background:** The definition of tumor deposits in colorectal cancer has been changed in different editions of the AJCC/TNM staging system. But the significance of tumor deposits in patients with regional lymph node

metastases is not clear. We investigated the effect of tumor deposits on survival in colorectal cancer patients with regional lymph node metastases

**Methods/Interventions:** Between 2010 and 2012, 814 patients who underwent curative surgical resection stage III colorectal cancer were included for this study. The patients with synchronous other malignancy and tumor deposits without regional lymph node metastases (N1c) were excluded (n= 90). We retrospectively analyzed the association between the 3-year overall survival and presence of tumor deposits

**Results/Outcome(s):** The 733 patients included 454 (61.9%) male and 279 (38.1%) female. The tumors were located in colon in 476 (64.9%) and rectum in 257 (35.1%). The median age of patient was 63 (IQR 54.0 ~70.0). The tumor deposits were observed in 175 patients with regional lymph node metastases (23.9%). The median number of tumor deposit was 2 (range 0 ~15). The median harvested lymph nodes were 21.0 (IQR 16.0 ~29.0) and median metastatic lymph nodes were 2 (IQR 1.0~4.0). The incidence of tumor deposits were increasing according to T and N stage : 4.3% for T1, 10.8% for T2, 26.3% for T3 and 32.2% for T4 (p = 0.001), whereas 16.1% for N1, and 31.4 % for N2 (P < 0.001). Median follow up time was 39.0 (IQR 31.0 ~ 48.0) months. The 3-year overall survival was 89.0 % in patients without tumor deposit and 78.4 % in patients with tumor deposit (p = 0.003). In multivariate Cox proportional hazards analysis, tumor deposit was an independently significant prognostic factor (HR 1.612, 95% CI 1.088-2.387, p=0.017) adjusted with age, gender, American Society Anesthesiologist score, tumor location, tumor differentiation, lymphovenous invasion, T stage and N stage.

**Conclusions/Discussion:** Tumor deposits were associated with poorer 3-year overall survival in colorectal cancer patients with regional lymph node metastases.

**P594 Surgical colons: criteria**

	Polyps $\geq$ 40mm	SSA/P $\geq$ 20mm	Polyps with HGD	$\geq 5$ Synchronous Adenomas	$\geq 5$ Synchronous SSA/P	Total* "Surgical colons"
Men (n=711)	9 (1.3%)	10 (1.4%)	4 (0.5%)	14 (2.0%)	2 (0.3%)	32 (4.5%)
Women (n=731)	5 (0.7%)	14 (1.9%)	7 (1.0%)	4 (0.5%)	2 (0.3%)	28 (3.8%)
Total* (n=1442)	14 (0.9%)	24 (1.7%)	11 (0.8%)	18 (1.2%)	4 (0.3%)	60 (4.2%)

\* 10 patients met multiple criteria: 4 pts had adenomas  $\geq$  40mm with HGD; 4 pts had SSA/P  $\geq$  40mm; 1 pt had an SSA/P  $\geq$  20cm and 6 adenomas; 1 pt had 9 SSA/P and 7 adenomas including one with HGD. All patients in total column are distinct patients



## QUALITY OF SURGICAL RESECTION OUTCOMES FOR OPEN SURGERY FOR RECTAL CANCER: A RAPID SYSTEMIC REVIEW AND META-ANALYSIS.

P596

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**Purpose/Background:** Circumferential resection margin (CRM), plane of mesorectal excision (PME), and distal resection margin (DRM) status are common measurements of the quality of surgical resection for rectal cancer and are important prognostic factors for local recurrence, disease-free and overall survival. We performed a systematic review to provide estimates of surgical resection outcomes for open surgery for rectal cancer to establish benchmarks for quality of surgical care for rectal cancer to be used to compare emerging minimally invasive approaches.

**Methods/Interventions:** A rapid review methodology was used. MEDLINE and Google Scholar were searched for (1) randomized clinical trials (RCTs) and (2) population-based studies reporting on quality of surgery for open surgery. RCTs were divided in those comparing surgical interventions and those comparing neoadjuvant regimens. We pooled the incidence of positive CRM, incomplete PME and positive DRM using random-effects meta-analysis.

**Results/Outcome(s):** Twenty-seven RCTs (15 comparing surgical interventions [2003-2015] and 12 comparing neoadjuvant regimens [1999-2011]) and 19 population-based studies [2002-2016] were identified. The pooled estimates for each outcome are presented by type of study and overall (Figure 1). The pooled positive CRM rate ranged from 5.6% (95% CI: 3.5-7.8) in the surgical trials to 10.8% (95% CI: 8.3-13.4) in population-based studies. Positive DRM ranged from 0.6% (95% CI: 0-1.2) in the surgical RCTs to 3.4% (95% CI: 0-7.8) in population-based studies. In contrast, the pooled incomplete PME rate had a wider range, from 3.6% (95% CI: 1.3-5.9) in patients in surgical RCTs to 18.2% (95% CI: 7.9-28.5) in patients in neoadjuvant RCTs.

**Conclusions/Discussion:** Estimates of surgical resection outcomes for open surgery were consistent across study designs. However, more variability was observed for incomplete PME. The quality of surgical resection was better in surgical RCTs as compared to RCTs of neoadjuvant therapy. This likely reflects technical improvements over time. Selection of patients based on tumour characteristics and the quality of pathological assessment might explain also the difference between study designs. These estimates are useful benchmarks for the calculation of sample size and assessment of the performance of open surgery in future RCT and for continuous assessment of the quality of surgical care by individual surgeons.

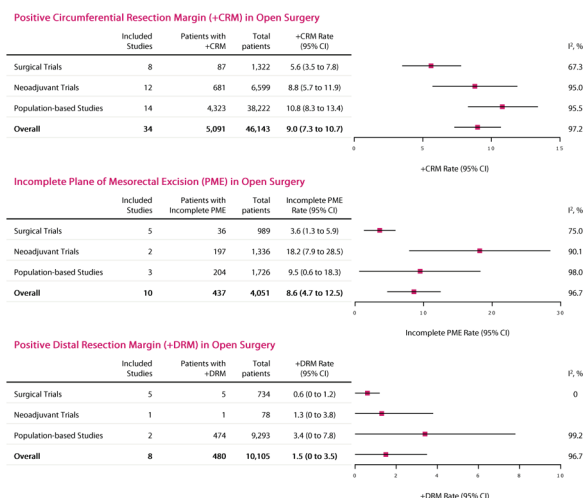


Figure 1. Summary Forest Plot for Quality of Surgical Resection Outcomes for Open Surgery for Rectal Cancer

## COMMUNITY-BASED MULTIDISCIPLINARY TUMOR BOARDS IN A LARGE SINGLE SPECIALTY GROUP: IDENTIFYING BARRIERS TO IMPROVEMENT IN RECTAL CANCER CARE.

P597

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**Purpose/Background:** Colorectal cancer is the second leading cause of cancer related death in the United States. In approximately 30% of cases, the primary tumor will arise in the rectum. Fifty percent of these will present with advanced local disease or lymph node metastases. Regardless of disease stage, there exists great variability in the workup and treatment. In 2011 the Optimizing the Surgical Treatment of Rectal Cancer (OSTRiCh) Consortium was created to improve the quality of rectal cancer care. One of the five core principles of evidence-based rectal cancer care emphasizes that each case be reviewed by "a multidisciplinary team that identifies, coordinates, delivers, and monitors the ideal treatment on an individual patient-by-patient basis." To continue to improve the quality of care for rectal cancer patients, we aimed to determine what percentage of patients were presented at a community-based multidisciplinary conference.

**Methods/Interventions:** All new rectal cancer patients were identified from the electronic medical record of a large single specialty colorectal group from January 1, 2015 to August 30, 2016. Patients of surgeons who predominantly practice in an academic center were excluded. The list was cross referenced with the system wide multidisciplinary tumor board registry.

**Results/Outcome(s):** In total 444 patients diagnosed with rectal cancer were identified, 296 were excluded as they received care at an academic center. The remaining 148 patients received their initial surgical consultation and

treatment within a community-based facility. The multidisciplinary tumor board registry identified that six of these patients (4.05%) were presented at a tumor conference within the same time period.

**Conclusions/Discussion:** The OSTRiCh consortium process standard includes a statement that individualized treatment-planning discussion must occur at a multidisciplinary tumor conference prior to definitive treatment, with a target rate of 100%. With only 4.05% of rectal cancer cases presented, there is need for significant improvement. While larger academic centers may have resources to present all cancer cases, the community setting has numerous limitations. Typically, patients are selected for presentation at the discretion of a treating physician, based upon a perceived complexity of the case. In addition, many providers cover multiple facilities, making it difficult to participate on a regular basis. To ensure 100% compliance, a more robust system is needed to capture newly diagnosed cases of rectal cancer and generate an automated submission for presentation at a multidisciplinary conference. With the growing body of literature on rectal cancer staging, neo-adjuvant and adjuvant therapies, conservative and palliative approaches, and individualized treatment plans, the “straight forward” rectal cancer case no longer exists and the multidisciplinary team has become a necessity.

#### ONCOLOGY-BASED QUALITY INITIATIVES: A SCOPING REVIEW ON SUSTAINABILITY.

P598

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**Purpose/Background:** Funders and policy makers are increasingly concerned about the sustainability of health care initiatives however there is a lack of a standardized approach to sustainability research. One reason is that project funding stops prior to the assessment of sustainability and there is lack of financial and staff support for this step. Sustainability of oncology-based quality initiatives, in particular, has garnered interest due to recent regional implementation of quality standards. The objective of this review is to perform a scoping review on sustainability of quality improvement initiatives in oncology; to derive an operational framework and to use this framework to develop a practical approach to planning for and assessing sustainability in this area.

**Methods/Interventions:** A scoping review was performed using MEDLINE, EMBASE, and Cochrane Database of Systematic Reviews. Medical Subject Headings were used to identify articles focusing on sustainability, cancer, and quality improvement. The grey literature was searched including: google scholar, websites of major funders of health services and public health research, academic

institutions, and provincial health care and cancer agencies. Inclusion criteria were set a priori. Methodological quality was assessed using criteria set out by the Cochrane Collaboration for non-randomized studies.

**Results/Outcome(s):** A total of 237 abstracts were reviewed; 10 were eligible for inclusion. Screening and treatment initiatives for cancer sites such as breast, colon, cervical, and hepatic cancer were included. Only 3 of the studies (27%) defined sustainability. Among these definitions, there was significant heterogeneity. Timing of sustainability evaluation ranged from 1.6 to 31 years following implementation of a quality initiative. In 100% of studies, the presence of a system to monitor progress was identified as a key factor to sustainability.

**Conclusions/Discussion:** The majority of studies did not, either a priori or retrospectively, provide an operational definition of sustainability. In those that did define sustainability, the definition was heterogeneous and not generalizable. The timing and method of sustainability measurement was also heterogeneous. The factors influencing sustainability of the initiatives, however, were homogeneous and included 3 major domains: quality initiative, staff, and organizational culture. These themes were prevalent among screening and treatment initiatives. As interest in sustainability grows, formalized rigorous research into sustainability will be increasingly important. This review shows that there is a lack of a standardized approach. Improvement in this area may impact decisions for funding and the allocation of research resources not only at the level of the quality initiative but potentially at an institutional or national level of cancer agencies.

#### RETROSPECTIVE ANALYSIS OF ENDOSCOPIC SUBMUCOSAL DISSECTION FOR COLONIC NEOPLASMS.

P599

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**Purpose/Background:** Endoscopic Submucosal Dissection is a new technique used to remove colonic polyps. ESD is performed by using a saline colloid solution injected into the submucosal plane to elevate the lesion followed by circumferential dissection with electrocautery knife. Early research is showing a significant improvement in post-operative course for patients after undergoing ESD versus laparoscopic resection for colon lesions. One study showed statistically significant differences in postoperative pain, hospital stay length, time to ambulation and time to oral intake; all favoring ESD over laparoscopic resection.. The advantage of performing ESD in the operating room is the ability to convert a case to laparoscopic immediately, delaying complications of acute perforation.

**Methods/Interventions:** Our case series evaluated all ESDs performed over the past two years to evaluate for

safety, efficacy and efficiency of this technique. We evaluated the conversion rate to laparoscopy, the current standard of care for resection of large polyps. Also our study evaluated size and location of lesions to identify the tumors that are most appropriate for ESD resection. The study reviewed the operative time and length of hospital stay for patients who underwent ESD. Our goal is to prove the ESD of colonic polyp is safe and efficient while also better delineating the most appropriate patients to undergo the procedure

**Results/Outcome(s):** We reviewed 56 consecutive ESD performed at Abington Hospital by two colorectal surgeons. 30 patients underwent an ESD removal of their pathology without additional intervention. The average size polyp removed by ESD was 2.05 cm with an average case length of 65 minutes. The average length of stay for an ESD was .23 days compared to 2.3 days in the laparoscopic group. The conversion rate to laparoscopic intervention, including cases in which the area was over sewn, was 46%. The majority of cases (77%) requiring laparoscopic intervention were for lesions located in the right colon. The most common reasons for conversion were inability to raise a plane and concern for perforation. The average polyp size for laparoscopic cases was 2.5 cm, with an average case length of 170 minutes. Pathology of the lesions requiring laparoscopy demonstrated high grade dysplasia or carcinoma in 23% (6/26 cases) as compared to 10% in the ESD patients (3/30 cases).

**Conclusions/Discussion:** Endoscopic submucosal dissection is a safe alternative to laparoscopic resection for colon polyps, especially in the descending/sigmoid colon. Furthermore, we found that the lesions that were more difficult to remove via ESD had a higher likelihood of being malignant.

#### INVESTIGATION OF EPCAM GERMLINE MUTATIONS IN CHINESE FAMILIES WITH LYNCH SYNDROME OR SUSPECTED LYNCH SYNDROME.

P600

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**Purpose/Background:** Lynch Syndrome (LS) is a frequent dominantly inherited cancer predisposition syndrome caused by germline alterations that affect DNA mismatch repair (MMR) genes MLH1, MSH2, MSH6 and PMS2. In addition, deletions of the EPCAM gene, which is located upstream of MSH2, have been discovered as a novel mutational mechanism in Lynch syndrome. But germline single nucleotide variants of EPCAM were rarely reported, especially in China. Here, we examined germline mutations of EPCAM gene in Chinese families with Lynch syndrome or suspected Lynch syndrome.

**Methods/Interventions:** We obtained 131 blood samples of subjects from 120 families. Seventy-one blood samples from normal people who had no family history of cancer were used as negative controls. Germline mutations were examined by Next Generation Sequencing (NGS), subsequently identified by Sanger Sequencing. Germline deletions were testified by Multiplex Ligation-dependent Probe Amplification (MLPA).

**Results/Outcome(s):** Seven different genetic variants of EPCAM were found by NGS, including four exonic variants, two intronic variants and one 5'-UTR variant. Among the exonic variants carriers, apart from two synonymous single nucleotide variants, two colorectal cancer patients from one pedigree both had the nonsynonymous single nucleotide variant (NM\_002354: c.C93G/p.N31K). One patient had a frameshift variant (NM\_002354: c.741dupT/p. T247fs). The MLPA results presented that 3 subjects carried with EPCAM exon-8 deletions, among which two were from one pedigree.

**Conclusions/Discussion:** In this study, we found 8 kinds of EPCAM germline variants in Chinese families with Lynch syndrome or suspected Lynch syndrome. It was speculated that the nonsynonymous single nucleotide variant (NM\_002354: c.C93G/p.N31K), the frameshift variant (NM\_002354: c.741dupT/p.T247fs) and exon-8 deletions may be new pathogenic factors of Lynch Syndrome. However the mechanisms need to be further explored.

#### THE OUTCOMES OF PALLIATIVE STENT PLACEMENT AS A TREATMENT FOR COLONIC OBSTRUCTION FROM COLORECTAL ADENOCARCINOMA.

P601

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**Purpose/Background:** Stent placement has benefits to avoid emergency surgery and stoma creation in the patients who had malignant colonic obstruction with unresectable metastasis, and may allow chemotherapy to be administered earlier. We investigated the outcomes of palliative stent placement as a treatment for colonic obstruction from colorectal adenocarcinoma with unresectable metastasis and determined the incidence of further surgical requirement after the stent placement

**Methods/Interventions:** Between 2002 and 2012, 87 patients underwent palliative stent placement for colonic obstruction from colorectal adenocarcinoma with unresectable metastasis. We collected these patients prospectively, analyzed medical records retrospectively. The clinical success rate was evaluated with the capability of oral intake and defecation of stool. The early complications within 1 week after stent insertion were investigated.

The late complications with patency rate and necessity for surgical treatment were also evaluated.

**Results/Outcome(s):** The mean age was 60.9 years (range, 19–96), and the male patients was 56 (64.4%). The sigmoid or descending colon was the most common site of obstruction in 52 (59.8%) patients, followed by rectum in 31 (35.6%), and ascending or transverse colon in 4 (4.6%). The most common site of metastasis was liver in 64 (73.6%), followed by peritoneum in 41 (47.1%) and lung in 37 (42.5%). Stent was inserted endoscopically in 69 (79.3%) and fluoroscopically in 18 (20.7%). Uncovered stent was performed in 76 (87.4%) and covered stent was in 11 (12.6%). All patients had experienced a technical success, but clinical success was achieved in 75 (86.2%). The early complication occurred in 13 (14.9%), and the most common complication was stent malfunction in 6 (6.9%), followed by colon perforation in 4 (4.6%), anorectal pain in 2 (2.3%), and stent migration in 1 (1.1%). Mortality related to the early complications was in 8 (9.2%). During the mean follow-up period of 8.0 months (range, 0.0–83.5), the late complications developed in 29 (33.3%). The most common complication was re-obstruction in 17 (19.5%), followed by stent migration in 8 (8.0%), colon perforation in 4 (3.4%). For the treatment of complications, repeated stent insertion was performed in 13 (14.9%), and finally operative treatment was done in 28 (32.2%) in mean 3.7 months (range, 0–30.8). Stoma was made in 23 (26.4%). Chemotherapy after stent placement was performed in 59 (67.8%). The overall patency rates at 6 months and 1 year were 52.6% and 38.0%, respectively. Uncovered stent was significant higher patency rate than covered stent (1 year, 41.7 vs 11.4%,  $p < 0.001$ ). The overall survival rates at 6 months and 1 year were 36.8% and 23.0%, respectively.

**Conclusions/Discussion:** Palliative stent placement had a high rate of clinical success immediately, but considerable number of patients required further surgical intervention for treatment of complications.

### HEMILEVATOR EXCISION THROUGH THE INTERSPHINCTERIC PLANE IN LOWER RECTAL CANCER: A NOVEL TECHNIQUE FOR ANAL SPHINCTER PRESERVATION AND SHORT-TERM OUTCOMES FOR 13 CONSECUTIVE PATIENTS.

P602

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Seoul, Korea (the Republic of)

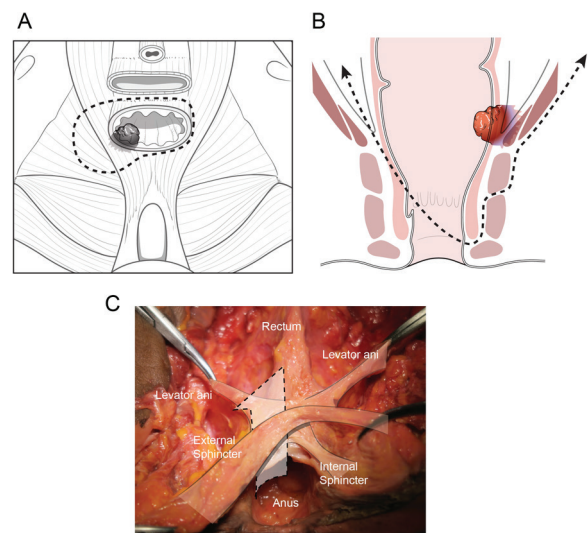
**Purpose/Background:** Rectal cancer at the anorectal junction level requires total excision of the levator-ani muscle to achieve an adequate circumferential resection margin. However, unless the tumor invades the levator-ani muscle circularly or over-hemicircularly around the

rectum, the involved levator-ani muscle can be removed with its contralateral side preserved. This hemilevator excision (HLE) technique followed by intersphincteric resection and coloanal anastomosis enables preserving the anal sphincter function while obtaining oncologic clearance and avoiding permanent colostomy in those patients. This study aimed to evaluate the surgical outcomes and feasibility of HLE.

**Methods/Interventions:** Data on 13 consecutive patients who underwent HLE for pathologically proven low rectal cancer were retrospectively collected. All 13 patients presented low rectal cancer at the anorectal ring level that was suspected to invade or abut to the ipsilateral side of the levator-ani muscle.

**Results/Outcome(s):** A secure resection margin was achieved in all cases, and anastomotic leakage occurred in two patients. During follow-up, three patients experienced tumor recurrence (two systemic and one local). Among six patients who underwent diverting ileostomy closure after the index operation, two complained of fecal incontinence. The other four patients without fecal incontinence showed <10 times of bowel movement per day.

**Conclusions/Discussion:** HLE is a novel sphincter-preserving technique that can be a treatment option for low rectal cancer invading the levator-ani muscle, which has been an indication for abdominoperineal resection (APR) or extralevator APR. However, the long-term oncologic and functional outcomes of this procedure still need to be assessed to confirm its validity.



Schematic of hemilevator excision

(a) Axial view of the extent of resection for hemilevator excision including the rectum and the invaded levator-ani muscle; (b) coronal view of the extent of resection for hemilevator excision through the intersphincteric plane and sleeve-fashion distal rectum resection; (c) dissection plane for hemilevator excision through the intersphincteric plane and outer to the levator-ani muscle in a cadaveric model

## THE EFFECT OF INCREASING BODY MASS INDEX ON LAPAROSCOPIC SURGERY FOR COLON AND RECTAL CANCER.

P603

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**Purpose/Background:** Obesity is common in Western countries and its prevalence is increasing. Colorectal cancer is common, and surgery for colorectal cancer is technically more challenging in obese patients. Laparoscopic surgery for colon cancer has been shown to be oncologically equivalent, with improved short-term outcomes. Laparoscopic surgery for rectal cancer has proven technically challenging, and recent results have raised concerns about oncologic equivalence. The aim is to evaluate the effect of body mass index (BMI) on the clinical and oncological outcomes of surgery for colorectal cancer, including the rate at which laparoscopic surgery is attempted and the rate at which laparoscopic surgery is converted to open surgery.

**Methods/Interventions:** A retrospective analysis of prospectively collected data from two tertiary institutions was performed. Data from the Cabrini Monash University colorectal neoplasia database for patients having surgical resection for colon and rectal cancers between January 1 2010 and June 30 2015. All data entered into the database were collected prospectively with near 100% complete data entry of surgeries performed at the two centres. Outcomes for this study were surgical and medical complications, return to theatre, length of hospital stay, readmission to hospital, 30-day mortality, and oncological outcomes of tumour recurrence or metastasis and overall survival. Logistic regression models were used to investigate associations between the specified outcomes and continuous BMI adjusted for associations. Disease-free and overall survival were assessed using survival analysis techniques with study entry set at the date of surgery. Significance was set as a  $p$  value  $< 0.05$ . To account for lack of independence between episodes within patients with multiple treatment episodes, all regression standard errors were calculated.

**Results/Outcome(s):** This large case series of 1464 patients undergoing elective surgery for colorectal cancer has demonstrated that an elevated BMI is associated with a lower likelihood of attempting laparoscopic surgery and a higher conversion rate to open surgery when laparoscopy is attempted. Conversion was 1.9 times more likely in obese patients with colon cancer, and 4.1 times more likely in obese patients with rectal cancer. The critical BMI for colon cancer patients was  $>35$ , and for rectal cancer patients was  $>30$ . Obesity was also associated with increased rates of surgical complications, including anastomotic leakage, wound complications. Pathological parameters, tumour recurrence and survival were not affected by elevated BMI.

**Conclusions/Discussion:** In the surgical management of colorectal cancer, obesity is associated with a lower likelihood of laparoscopic surgery being attempted, a higher likelihood of conversion to open surgery when laparoscopic surgery is attempted, and a higher rate of surgical complications.

## PROGNOSTIC FACTORS OF LOCALLY RECURRENT RECTAL CANCER PATIENTS: FOCUSED ON PREDICTIVE FACTORS TO ACHIEVE CURATIVE RESECTION.

P604

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**Purpose/Background:** R0 resection for locally recurrent rectal cancer (LRRC) is one of well-known good prognostic factors. However, achieving R0 resection for LRRC is challenging to colorectal surgeons. This study is aimed to evaluate factors affecting R0 resection of LRRC and associated factors with prognosis after local recurrence (LR).

**Methods/Interventions:** We retrospectively reviewed medical records of 117 patients presenting LRRC with or without systemic recurrence (SR) who underwent curative resections of primary tumor (PT) during past 12 years. Clinicopathologic data were collected including symptoms (Sx.) and CEA levels at the time of diagnosis (Dx.) of LRRC, location (central, anterior, posterior, lateral and perineal), fixity (F0, not fixed; F1, fixed at one site; F2, fixed to two sites; F3, fixed to three or more sites), treatment strategies and oncologic outcomes of LRRC, and PT-related data as well.

**Results/Outcome(s):** The median follow-up duration and the median duration between the first curative resection and the diagnosis of LRRC were 51 (4~153) and 17 (1~75) months, respectively. Among the patients, 44, 8, 5 and 60 patients respectively underwent R0, R1, R2 and no resection for LRRC. In addition, 67 patients were treated with multimodal therapies. In the multivariate analysis of factors affecting R0 resection, the level of PT, p/ypT stage of PT, pattern of recurrence (LR only vs with SR), and centrally located LRRC showed statistically significant association with R0 resection of LRRC. In the multivariate analysis of prognostic factors for overall survival (OS) after LRRC diagnosed, higher p/ypT stage of PT (HR 3.645 (95% confidence interval (CI) 1.639~8.109),  $p=0.002$ ) and existence of any Sx. (HR 2.43 (95% CI 1.444~4.091),  $p=0.001$ ) at the time of Dx. of LRRC were poor prognostic factors. The patients who underwent R0 resection for LRRC showed higher 5 year-OS of 39.20% compared to 24.10% of the palliation group (R1, R2, no resection) in survival curve ( $p=0.010$ ).

**Conclusions/Discussion:** We could find that the patients with upper rectal cancer, early p/ypT stage of PT, isolated LR without SR, or centrally located LRRC had

higher probabilities of achieving R0 resection for LRRC than the palliation group. Furthermore, this study revealed that p/ypT stage of PT and Sx. at the time of Dx. of LRRC were the independent prognostic factors of OS. It implies that early detection of LRRC after PT resection by regular work-ups are important for achieving R0 resection of LRRC and for prognosis after LR, especially in patients with advanced PT.

**PATTERN OF LOCOREGIONAL RECURRENCE AFTER LONG-COURSE NEOADJUVANT CHEMORADIOTHERAPY AND RADICAL SURGERY FOR LOCALLY ADVANCED RECTAL ADENOCARCINOMA: TIME TO RETHINK THE VOLUME OF RADIATION THERAPY?**

P605

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**Purpose/Background:** Neoadjuvant chemoradiation therapy (CRT) is considered the standard of care for locally advanced rectal cancer. Classically, the cranial border of clinical target volume (CTV) of radiation has been the level of the bifurcation of common iliac arteries (L4-L5 interspace). However, based on the current patterns of pelvic recurrences and the toxicity related to the volume of small bowel irradiated, some slight adjustments as lowering the cranial border of CTV to the sacral promontory, have been suggested. The aim of this study was to determine the overall locoregional recurrence rate and the one located between L4-L5 interspace and the sacral promontory.

**Methods/Interventions:** After Institutional Review Board approval, a prospective cancer-specific database was reviewed. Those patients with locally advanced rectal cancer (T3cd, T4, N2 or candidates to an abdominoperineal resection), who received preoperative CRT and radical surgery between 2007 and 2014, were analyzed. Cranial border of our CTV was L4-L5 interspace. To identify those variables associated to local recurrence, a bivariate analysis was performed.

**Results/Outcome(s):** After exclusion criteria, 111 patients were identified. Median age was 63.45 years (SD  $\pm$ 13.8) and 59% (95% CI: 49-68) were males. Forty seven patients (42.3%; 95%CI: 33-52) presented tumors located in the middle rectum and 64 (57%; 95%CI: 48-69) in the low rectum. Mean distance of the tumors to the anal verge was 5.9 cm (SD  $\pm$ 2.5), and sphincteric involvement was observed in 30 patients (27%; 95%CI: 17-33). At preoperative local staging, 56.7% of patients (95%CI: 42-68) presented advanced lesions (mrT3: 48.6%, mrT4: 8.1%) and 57.6% (95%CI: 48-67) were mrN positive. With a median follow-up of 42 months, 8 patients (7.2%; 95%CI: 3.2-13.7) presented locoregional recurrence, and all of them were below the level of the sacral promontory.

None of the recurrences were located in the area between L4-L5 interspace and the promontory. Positive lymph nodes (OR: 15.5; 95%CI: 1.83-131.5; p=0.012), tumor regression grade (OR: 0.19; 95%CI: 0.58-65; p=0.008), positive circumferential resection margin (OR: 11.1; 95%CI: 1.54-79; p=0.017) and perineural invasion (OR: 11.4; 95%CI: 2.4-79.6; p =0.017), were significantly associated with local recurrence.

**Conclusions/Discussion:** Locoregional recurrence rate was according with the one expected. The recurrence rate above the promontory was null. Although the cause of this last finding may be multifactorial, lowering the cranial border of the CTV may be an attractive line of research in order to avoid the toxicity over the small bowel without affecting the oncological outcomes in terms of locoregional recurrence rate.

**TRANSANAL TOTAL MESORECTUM EXCISION: AN INITIAL EXPERIENCE OF 60 CASES IN A SINGLE CENTER.**

P606

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**Purpose/Background:** Low anterior resection (LAR) can present a formidable surgical challenge, particularly for tumours located in the distal third of the rectum. Transanal total mesorectal excision (taTME) aims to overcome some of these difficulties. We report our initial experience with this technique.

**Methods/Interventions:** From June 2014 to June 2016, 60 selected patients underwent total mesorectal excision for rectal cancers. All patients with rectal cancer were discussed at a multidisciplinary team meeting. Data were entered into a prospective managed international database.

**Results/Outcome(s):** Of the 60 patients (34 male), forty-four (83%) had rectal cancer lying at the distal third of the rectum (less than 7cm from the anal verge). Pure transanal total mesorectal excision (pTaTME) was performed in 21 patients, other 39 cases underwent TaTME with laparoscopic assistance, including 8 cases using single-port assistance. The mean operation time was 220 min, the average blood loss was about 170 ml. Intraoperative complications were occurred in two patients (urinary tract damage and blood). Thirty-day morbidity was minor (Clavien-Dindo I-II) in 15% and major (Clavien-Dindo III-IV) in 5%. No patient died within the first 30 days postsurgery. The anastomosis leakage rate was 10%. The average length of specimen was 11.45 $\pm$ 3.10cm, the number of harvested lymph nodes were 13.70 $\pm$ 4.07. The average distal margin distance from the tumor was 1.29 $\pm$ 0.69cm. There was no positive circumferential resection margin observed in any case. Through the learning curve analysis, we observed that for a well-skilled laparoscopic colorectal surgeon, by following the standard surgical procedures, are likely to overcome the

learning curve smoothly after performing approximately 30 cases of TaTME. For all the cases, the mean follow-up was 16 months, with a 3.3% local recurrence rate and a 1.7% rate of systemic recurrence. One patient died of other disease.

**Conclusions/Discussion:** TaTME is a new developing technique in rectal cancer surgery. In our initial experience, evaluation of short-term outcomes demonstrated that TaTME is safe and feasible in patients with low rectal cancer

## IS RECTAL CANCER IN PATIENTS UNDER 50 YEARS MORE AGGRESSIVE?

P607

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**Purpose/Background:** During the last decades there was an increased incidence of colorectal cancer in underdeveloped countries. Specifically in rectal cancer, there seems to be a higher incidence in patients younger than 50 years. It is not clear if this group have a different outcome. The aim of this study is to evaluate the oncologic outcome of patients under 50 years with rectal cancer.

**Methods/Interventions:** A retrospective analysis of prospectively collected database from patients undergoing laparoscopic low anterior resection for extraperitoneal rectal cancer between 2005 and 2015 was performed. Patients followed for at least 6 months were included. The sample was divided into 2 groups, G1: < 50 years and G2: ≥50 years. Demographic (age, sex, BMI, ASA score) surgical, histopathological and oncological outcomes were analyzed. Survival was analyzed using the Kaplan-Meier method and the log-rank test.

**Results/Outcome(s):** From 126 patients operated for extraperitoneal rectal cancer, 103 met the inclusion criteria. Twenty patients belonged to G1 and eighty-three to G2. There were no differences between the two groups in demographic data or stage of disease at the time of diagnosis. In G1, 12 (60%) patients underwent neoadjuvant treatment and 43 (52%) in G2 (p: 0.63). The rate of lymphovascular invasion (G1: 40% vs 14.5%, p: 0.01) and of high grade tumors (G1: 35% vs 13.2%, P: 0.02) was significantly higher in G1. In G2, the rate of complete pathological response was increased (Ryan 0: G1: 0% vs G2: 28%, p: 0.03). At the same time, the mean survival of G1 was lower compared with G2 (72 and 100 months respectively, Log Rank: 0.059).

**Conclusions/Discussion:** Extraperitoneal rectal carcinoma in patients younger than 50 years presents more aggressive histopathological features. At the same time, there would be a tendency to a decreased survival in this group of patients.

## CLINICAL OUTCOMES OF PELVIC LYMPH NODE DISSECTION AFTER PREOPERATIVE CHEMORADIATION TREATMENT FOR RECTAL CANCER BASED ON A SINGLE CENTER EXPERIENCE.

P608

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**Purpose/Background:** Although some reported pelvic lymph node dissection (PLND) can reduce local recurrence, there are still controversies whether lateral pelvic lymph node (PLN) involvement is a regional or systemic disease. So far, only a few limited studies have been conducted to establish optimal selection criteria for PLND. However, optimal criteria is still undetermined. There are also some adverse effect of PLND in terms of postoperative complications. The aim of this study is to investigate the clinical outcomes of PLND after preoperative chemoradiation therapy (CRT) for rectal cancer.

**Methods/Interventions:** A total of 149 patients with rectal cancer who underwent curative resection between April 2011 and Sep 2016 were included for the analysis. In this study, clinically suspected PLN metastasis was defined as short axis diameter of PLN remained ≥ 5mm after preoperative CRT. Patients underwent TME with PLND after 6-8 weeks after preoperative CRT. They were classified into the group with PLND (PLND; n=104) and without PLND (N-PLND; n=45). Clinicopathologic characteristics, postoperative morbidity between the two groups were compared.

**Results/Outcome(s):** Standard PLND including obturator LN was performed in 56.7% and the remaining patients underwent selective PLND (cherry picking LND based on localization in MRI). There were no significant differences in operation time (PLND 384.6±116.1 vs. N-PLND 368.4±149.0; P=0.472) and estimated blood loss (PLND 345.8±370.1 vs. N-PLND 334.9±391.0; P=0.377). Postoperative complications did not differ between the groups and only three patients suffered from paresthesia within postoperative 30 days in PLND (P=0.279). The PLN positivity was identified in 15/104 (14.4%) among PLND group. The number of positive LN (PLND 21.3±10.4 vs. N-PLND 16.6±11.0; P=0.343) and N stage (P=0.143) didn't show any difference between two groups.

**Conclusions/Discussion:** Although PLND was performed selectively for about 50% patients in our institution, the positivity of PLN (14.4%) was not inferior to outcomes of standard PLND in Japan. In the management of lateral PLN for rectal cancer, we need to reconsider about benefits of standard PLND and whether cherry picking is safe and feasible or not. We need further study to investigate the oncologic outcomes between standard PLND and selective PLND (cherry picking).

### CHRONIC COMPLICATION RELATED ANASTOMOSIS AFTER SPHINCTER SAVING SURGERY FOR RECTAL CANCER: SUBTYPES AND PREDISPOSING FACTORS.

P609

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**Purpose/Background: Purpose:** Many studies have reported on the risk factors of anastomotic leakage (AL) over the last decade regarding the effect of preoperative chemoradiotherapy (pCRT), however, there are few study about chronic complication related anastomosis. Aim is to assess the clinical characteristics and predisposing factors of chronic complication related anastomosis following low anterior resection (LAR) for rectal cancer.

**Methods/Interventions: Methods:** From January 2005 to December 2014, a total of 1904 consecutive patients who underwent LAR for rectal cancer were eligible. The patients were treated with (n = 711) or without (n = 1193) pCRT. Chronic complication related anastomosis was defined according to the time (after 30 days postoperatively). The variables and risk factors associated with chronic complication related anastomosis were analyzed by multivariate logistic regression and propensity scoring matching (PSM). Baseline characteristics for PSM were age, sex, surgeon, intraoperative transfusion, operative method, BMI, Tumor location, operative time, ASA score.

**Results/Outcome(s): Results:** Chronic complication related anastomosis occurred in 143 patients. After PSM, the incidence of chronic complication related anastomosis in patients with or without pCRT was 14.8% and 3.8%, respectively (P < 0.001). Chronic complication related anastomosis had several types and included fistula formation (n = 45), stenosis of rectal lumen (n = 35), leakage with sinus (n = 32), abscess formation in pelvic cavity (n = 27), and necrotizing fasciitis (n = 4). Chronic complication related anastomosis was diagnosed at a median of 7 (range: 2-97) months postoperatively, 54.5% among them occurred within 8 months. Of 143 patients, 36 patients were asymptomatic without further treatment, 69 patients underwent laparotomy, and 16 patients could not repair diverting ileostomy. In multivariate analysis, pCRT (hazard ratio: 3.7, 95% CI: 2.4-5.6, P < 0.001) and tumor location (hazard ratio: 3.1, 95% CI: 1.6-5.9, P < 0.001) were independent and significant predisposing factor for chronic complication related anastomosis. Diverting ileostomy did not protect against complication.

**Conclusions/Discussion: Conclusion:** Rate of chronic complication related anastomosis that develops after 30 days following LAR was 7.5% (143/1904). Chronic complication related anastomosis can occur at any time postoperatively and represent in a broad spectrum, which can be seen from asymptomatic complication to life threatening-necrotizing fasciitis. Even if without symptom, it

must be recognized and managed properly with respect to the risk of complication, especially in case of performing pCRT.

### ARE ALL CONVERSIONS THE SAME: RESULTS OF LAPAROSCOPIC CONVERSIONS FOR RECTAL CANCER.

P610

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**Purpose/Background:** Recent data suggests the possibility of oncologic compromise associated with minimally invasive surgery for rectal cancer. Furthermore, the need to convert may represent ominous tumor or patient factors and thus represent a group at high risk for poorer outcomes. Our purpose was to evaluate whether indication for conversion in laparoscopic rectal cancer surgery is associated with differences in circumferential resection margin(CRM), distal resection margin(DRM), postoperative complication rate, length of stay(LOS), disease-free survival(DFS) or overall survival(OS) as compared open surgery.

**Methods/Interventions:** Single institution retrospective matched case-control. Indication for conversion was categorized as either Error in Judgement(EJ) or Error in Technique(ET). EJ was defined as conversion due to locally advanced disease not oncologically amenable to laparoscopic surgery or intraoperative complication, e.g. bleeding. ET was defined as conversion due to technical difficulty, e.g. adhesions, narrow pelvis. Both groups were matched 1:2 to control patients who underwent primary open surgery(POS) based on variables: pathologic T stage(pT stage), pathologic node positive disease(N+), overall stage, neoadjuvant radiation treatment, and stoma. Outcomes of CRM, DRM, and complications were assessed using Chi Square and Fisher Exact tests. LOS was assessed using t-test. DFS and OS were estimated by Kaplan-Meier method.

**Results/Outcome(s):** Of 253 patients who underwent surgery for rectal cancer, 33 patients had laparoscopic conversion to open surgery. 15 patients were categorized as EJ and 15 categorized as ET, and 30 matched controls were identified for each group. 3 patients were excluded for inability to match. EJ patients were well matched to POS controls by pT stage(p=0.8), overall stage(p=0.9), N+(p=0.7), neoadjuvant radiation(p=1.0), stoma(p=1.0), and ASA score (ASA) (p= 0.2). ET patients were well matched to POS controls by pT stage, overall stage, N+, neoadjuvant radiation, stoma, and ASA score with p=1.0,1.0,1.0,1.0, and 0.2 respectively. As compared to controls, EJ patients had similarly negative CRM(93.3 vs 90%, p= 1.0), DRM(100 vs 100%, p=1.0), complications(6.7 vs 3.3%, p=0.4),



LOS(7.2 +/- 2.2 vs 8.5+/-1.1 days, p=0.4), DFS(40.8+/-33.8 vs 49.3+/-31.1 months, p=0.4), and OS(42.8+/-33.7 vs 53.8+/-29.5 months, p=0.3). As compared to controls ET patients had similarly negative CRM(100 vs 86.7%, p=0.4), DRM(100 vs 100%, p=1.0), complications(20 vs 6.7%, p=0.3), LOS(7.3+/-3.6 vs 7.1+/-2.4 days, p=0.8), DFS(38.9+/-31.7 vs 42.1+/-25.5 months, p=0.7), and OS(38.4+/- 30.5 vs 46.2+/-26.0 months, p=0.4).

**Conclusions/Discussion:** Regardless of indication for conversion, laparoscopic conversion patients have similar outcomes with regards to margin status, complications, and survival as primary open surgery patients. Our data suggests it is oncologically safe to begin surgery for rectal cancer laparoscopically and convert when necessary.

### ANORECTAL FUNCTIONAL OUTCOMES AFTER SPHINCTER-PRESERVING SURGERY IN RECTAL CANCER: IS IT POSSIBLE PATIENTS WITH TOTAL PROCTECTOMY TO IMPROVE THEIR ANORECTAL FUNCTION AFTER THE LAPSE OF TIME?

P611

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**Purpose/Background:** Anorectal bowel dysfunction after rectal cancer surgery manifests various symptoms including increased bowel movement, urgency and fecal incontinence. As sphincter-preserving surgery becomes popular, we need to evaluate functional outcomes after surgery. The aim of this study is to evaluate the anorectal functional outcomes after sphincter-preserving surgery in rectal cancer.

**Methods/Interventions:** A total of 179 patients with rectal cancer who underwent curative resection between Feb 2009 and Aug 2016 were included for the analysis. Survey about functional outcomes was performed by using Memorial Sloan Kettering Cancer Center Bowel Function Instrument (MSKCC BFI) and Wexner scores through outpatient clinic with face to face interview. MSKCC BFI is designed for evaluating bowel function and consists of three subscales (frequency, diet, urgency/soilage and four single items. Among them, 79 patients had ileostomy and answered the questions after ileostomy repair. Functional outcomes were compared according to time interval with

1 year, 3 years and 5 years from operation to survey. Median follow up period for survey was 28.6 months after surgery including ileostomy repair.

**Results/Outcome(s):** Patients without ileostomy showed fecal incontinence to improve after 1 year from operation significantly (Wexner score  $\leq$  1yr 6.2 $\pm$ 5.5 vs. from 1 to 3yr 2.6 $\pm$ 3.5; P=0.006) However patients with ileostomy didn't show differences according to time interval. When compared MSKCC scores, patients without ileostomy showed improved bowel function after 1 year (MSKCC score  $\leq$  1yr 66.8 $\pm$ 9.0 vs. from 1 to 3yr 72.1 $\pm$ 8.0; P=0.027). Patients with ileostomy showed similar bowel function after 1 year (P=0.636). Frequency of bowel movement was not different (without ileostomy 5.2 times/day vs. with ileostomy 7.3 times/day; P=0.056) and total score of MSKCC was higher significantly in patients without ileostomy (without ileostomy 69.7 $\pm$ 8.2 vs. with ileostomy 66.4 $\pm$ 9.9; P=0.016). When compared between without and group with ileostomy, the ratio of low rectal cancer was higher significantly in ileostomy group (P<0.001). The ratio of preoperative chemoradiation treatment (CRT) was different (without ileostomy 25.0% vs. with ileostomy 68.4%; P<0.001). Patients with ileostomy underwent ultra low anterior resection (LAR) in 26.6% while patients without ileostomy underwent only LAR (P<0.001).

**Conclusions/Discussion:** According to our observation based on Wexner and MSKCC scores, total or near total proctectomy or preoperative CRT can cause adverse effect on anorectal function in rectal cancer treatment. Thus, physicians should consider the influence of treatments on quality of life and choose the treatments for patients.

### DIAGNOSTIC ACCURACY OF PET/CT TO DETECT PRESENCE OR ABSENCE OF COLONIC NEOPLASTIC LESIONS.

P612

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**Purpose/Background:** Positron emission tomography (PET) with fluoro-deoxyglucose (FDG) is a widely used diagnostic modality for neoplastic disease. About 1.3-3.4% of PET scans performed to evaluate non-colonic malignancies will reveal an incidental colonic lesion. The optimal approach towards patients with incidental PET avid

**P612 2x2 Contingency Table**

PET/CT	Pre-Malignant/Malignant Lesion				Total
	Present	n	Absent	n	
Positive	True Positive	57	False Positive	43	100
Negative	False Negative	14	True Negative	56	71
Total		71		99	

colonic lesions is not known. Furthermore, the sensitivity of PET scans negative for colonic lesions has never been investigated. Given the recent increase in the use of PET/CT, clinicians are increasingly faced with these clinical scenarios. The aim of our study is to assess the diagnostic accuracy of PET/CT to detect presence or absence of colonic lesions in an attempt to define clinical approach towards these patients.

**Methods/Interventions:** The medical records at our institution were queried between 2013 and 2015. All patients who underwent a colonoscopic exam within 3 months of receiving a PET/CT scan were identified. Patients with prior history of colorectal malignancy were excluded. Unpaired t-test was performed to compare Standardized Uptake Values (SUV) between malignant and nonmalignant lesions. Pearson Correlation Coefficient was used to relate adenoma size and SUV values.

**Results/Outcome(s):** We identified a total of 171 colonoscopic exams that were performed within three months of a PET scan. Out of these, 100 were done in patients with PET/CT revealing a FDG avid colonic lesion whereas 71 were performed in patients with PET/CT scans negative for increased colonic avidity. Fifty seven percent of colonoscopic exams performed in patients with PET avid colonic lesions confirmed presence of colonic neoplastic disease. Out of these, 10 (10%) were malignant (adenocarcinoma) and the remainder were premalignant (adenomas, serrated adenomas). There was significant difference between SUV for malignant and benign lesions (mean 19.57 vs. 10.36,  $p = <0.0001$ ). The majority of the premalignant lesions were  $>1\text{cm}$  ( $n=36$ , 63.2%). On the other hand, out of 71 colonoscopic exams performed for patients with negative PET/CT, 14 (19.7%) patients had pre-malignant lesions. The majority of these lesions (78.6%) were  $<1\text{cm}$  and no malignancy was identified in this group. The sensitivity of PET/CT to identify pre-malignant lesions was calculated to be 80.28% (95%CI 69.14-88.78) and specificity was 57.0% (95%CI 46.71-66.86). Additionally, there is a weak correlation between the size of the adenoma and SUV value (Pearson Correlation Coefficient 0.227).

**Conclusions/Discussion:** We strongly recommend that incidental PET avid colonic lesions should be further evaluated with colonoscopic exam as many of these lesions will turn out to be malignant. A higher SUV value is associated with increased risk of malignancy. However, there does not appear to be strong correlation between tumor size and SUV value. A negative PET/CT carries a high sensitivity (80.28%) for ruling out colonic neoplasia, especially malignant lesions and for lesions  $> 1\text{cm}$  in size.

## USEFULNESS OF ICG SYSTEM FOR AVOIDING ANASTOMOTIC LEAKAGE IN LAPAROSCOPIC ANTERIOR RESECTION.

P613

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**Purpose/Background:** Insufficient blood flow is the major cause of anastomotic leakage (AL). So intraoperative blood flow evaluation is very important. Indocyanine green (ICG) fluorescent system can perform intraoperative bloodflow evaluation in various organs. The aim of this study is to establish the new strategy using ICG-system for avoiding AL in laparoscopic anterior resection.

**Methods/Interventions:** Rectal cancer patients ( $n=79$ ) who underwent laparoscopic anterior resection were included. Bloodflow of the stumps of the colon were evaluated using ICG fluorescent system. After resection of rectum, 7.5mg of ICG was administered, and the blood flow of oral stump was evaluated by measuring fluorescent time (FT). Relationship between the time until recognition of blood flow at the stump and anastomotic leakage was investigated.

**Results/Outcome(s):** Seven of seventy nine patients (8.9%) suffered AL. In five patients with FT over 60 seconds, AL rate was 60% (3/5 patients), while AL rate was 5.4% in patients with FT within 60 seconds. In the rest four patients having AL, three patients had longer FT (50~60sec). Furthermore, the three patients had several risk factors, such as gender (male), high BMI, long operation time, multiple stapling fires, and other medical factors (diabetes mellitus, long time administration of steroids, etc.). Only one patient (FT=45sec) with AL had no risk factor.

**Conclusions/Discussion:** ICG fluorescent system is useful for evaluating blood flow, and avoiding AL in laparoscopic anterior resection. Based on our results, the following strategy may be recommended : covering ileostomy should be made in patients with FT over 60sec or FT more than 50sec and 2 or more risk factors.

## WOULD IMMUNOLOGIC MARKERS DERIVED FROM COMPLETE BLOOD COUNT ASSOCIATED WITH TUMOR RESPONSE AND PROGNOSIS IN PATIENTS TREATED WITH PREOPERATIVE CHEMORADIOTHERAPY?

P614

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**Purpose/Background:** We investigated whether immunologic markers with complete blood count (CBC) would be associated with treatment responsiveness to preoperative chemoradiation therapy (PCRT) and oncologic

outcome in patients with locally advanced rectal cancer (LARC) underwent PCRT with surgery.

**Methods/Interventions:** A total of 984 patients with LARC who treated with PCRT followed by radical surgery at Asan medical center from 2005 to 2013 were enrolled and analyzed retrospectively. Peripheral blood was obtained within 7 days before start of PCRT. CBC parameters including neutrophil-lymphocyte ratio (NLR), lymphocyte-monocyte ratio (LMR) and platelet-lymphocyte ratios (PLR) were recorded. Pathologic responses to PCRT were evaluated in the resected specimens using the tumor regression grade (TRG) system suggested by the Korean Society of Pathologists. The cut-off values of immunologic markers (NLR, LMR and PLR) were calculated for analyzing association with recurrence-free survival (RFS).

**Results/Outcome(s):** One hundred ninety five patients achieved total regression of primary tumor and 789 patients had residual disease. In the receiver operating characteristic analysis, NLR, PLR and LMR did not have the ability to distinguish total regression and residual disease group after PCRT. The cut-off values of NLR,

LMR and PLR were 1.7, 6.8 and 92.88, respectively. In univariate analysis, low NLR( $\leq 1.7$ ), high LMR( $>6.8$ ) and high PLR( $>92.88$ ) were favorable factors for RFS. In multivariate analysis, high PLR was associated with better RFS (HR, 0.649; 95% CI, 0.473-0.89;  $P=0.007$ ). In separating analysis for each stage, high NLR( $>1.7$ ) was independently poor prognostic factor in stage 2 (HR, 1.868; 95% CI, 1.08-3.109;  $P=0.025$ ) and high PLR was the better associated factor with RFS in stage 3 (HR, 0.675; 95% CI, 0.421-0.957;  $P=0.03$ ).

**Conclusions/Discussion:** The immunologic markers with CBC (NLR, LMR and PLR) were independently associated with RFS in patients with LARC who treated with PCRT and radical resection. But, these markers could not predict total regression of primary tumor after PCRT.

**P614 Univariate and multivariate analysis of factors associated with recurrence-free survival**

Variables	Univariate		Multivariate		
	Hazard ratio	P	Hazard ratio	95% CI	P
NLR		0.008			0.07
Low NLR ( $\leq 1.7$ )	1		1		
High NLR ( $>1.7$ )	1.446		1.319	0.978-5.087	
LMR		0.008			0.092
Low LMR ( $\leq 6.8$ )	1		1		
High LMR ( $>6.8$ )	0.53		0.658	0.405-1.070	
PLR		0.076			0.007
Low PLR ( $\leq 92.88$ )	1		1		
High PLR ( $>92.88$ )	0.765		0.649	0.473-0.89	
ypT stage		<0.001			<0.001
ypT0	1		1		
ypT1	0.388		0.417	0.097-1.799	
ypT2	1.852		1.694	0.972-1.449	
ypT3	5.216		3.297	1.980-5.491	
ypT4	6.235		3.208	0.74-14.7	
ypN stage		<0.001			<0.001
ypN0	1		1		
ypN1	2.931		1.882	1.385-2.557	
ypN2	5.347		2.345	1.538-3.575	
Lymphovascular invasion	3.637	<0.001	1.762	1.229-2.526	0.002
Perineural invasion	3.195	<0.001	1.509	1.093-2.083	0.012
Age, yrs		0.648			
$\leq 70$	1				
$>70$	1.09				
Gender		0.431			
Male	1				
Female	0.893				

NLR, neutrophil-lymphocyte ratio; LMR, lymphocyte-monocyte ratio; PLR, platelet-lymphocyte ratio

### OPTIMAL TREATMENT STRATEGIES FOR CLINICALLY SUSPICIOUS LATERAL PELVIC LYMPH NODE METASTASIS IN RECTAL CANCER.

P615

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**Purpose/Background:** Lateral pelvic lymph node (LPN) metastasis is a major cause of local recurrence in patients with advanced rectal cancer treated by total mesorectal excision (TME), even after preoperative chemoradiotherapy (CRT). Lateral pelvic lymph node dissection (LPND) may improve local control and survival with rectal cancer and pelvic node metastasis following preoperative CRT, but remains controversial. We aimed to determine the optimal indications for LPND after preoperative CRT in patients with locally advanced rectal cancer.

**Methods/Interventions:** Of 377 patients who received preoperative CRT for locally advanced rectal cancer between 2006 and 2013, 84 (22.3%) had suspicious LPNs observed on pretreatment magnetic resonance imaging (MRI). MRI findings before and after CRT, clinical factors, LPN metastasis, and oncologic outcomes were analyzed retrospectively.

**Results/Outcome(s):** Of 84 patients with suspicious LPN, 61 patients had a short-axis diameter < 5mm (LPN had responded to CRT) by post-CRT MRI. Of these patients, 31 underwent TME alone (Group A), and 30 underwent TME plus LPND (Group B). The remaining 23 patients had persistently suspicious LPNs observed on post-CRT MRI and underwent TME plus LPND (Group C). Pathologic LPN metastasis was confirmed in 5 patients (16.7%) in group B and 15 (62.5%) in group C. Local recurrence developed in 7 (22.6%), 0 (0%), and 4 (17.4%) patients in groups A, B, and C, respectively. The 3-year disease-free survival rates were 53.7%, 74.2%, and 46.9% in groups A, B, and C, respectively. Five patients (16.1%) in the group A developed *in situ* LPN recurrence, and LPN metastasis was confirmed after salvage resection of the recurrence. A short-axis LPN diameter  $\geq$  7mm on pretreatment MRI was significantly associated with local recurrence in the group A.

**Conclusions/Discussion:** Study findings suggested that LPND cannot be omitted for patients with suspicious LPNs on pretreatment MRI even with good response to preoperative CRT. Findings from pretreatment MRI should be considered to determine whether LPND is indicated.

### PSEUDOMYXOMA PERITONEI: AN OVERALL ANALYSIS OF 79 PATIENTS TREATED AT A SINGLE INSTITUTION.

P616

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**Purpose/Background:** Pseudomyxoma peritonei (PMP) is a clinical term for gelatinous ascites, usually secondary to an appendiceal tumor. PMP has not a definite standard of diagnosis and treatment up to now, and is classified according to pathology, Disseminated peritoneal adenomucinosis (DPAM) and Peritoneal mucinous carcinomatosis (PMCA). There are nothing to prove effective treatment except for Cytoreductive surgery & HIPEC. So many studies recommend Cytoreductive surgery & HIPEC for PMP. The aim of this study are to compare oncologic outcome according to histologic type of PMP and to demonstrate effective treatment of PMP in single institution.

**Methods/Interventions:** From March 2005 to June 2016, 79 patients with PMP who had diagnosed and treated at a Severance hospital. They were classified according to histologic type of WHO criteria, DPAM (N=50) and PMCA (N=29). The medical records of patients were reviewed retrospectively for clinicopathologic features, perioperative factors, and vital status at the time of the last follow-up evaluation.

**Results/Outcome(s):** A total of 79 patients were analyzed (50 DPAM patients and 29 PMCA patients). In clinicopathologic feature, patient comparisons showed that PMCA group had a significantly higher proportion of postoperative systemic chemotherapy ( $p=0.038$ ) and lower decrease of serum CA 19-9 level ( $p=0.036$ ) than DPAM group. And for validate the effective treatment of PMP, we compare Operation group (N=36) with Operation with systemic chemotherapy group (N=39) regardless of histologic type. But, There were no statistically significant difference in the clinicopathological features and oncologic outcome between two groups. Although follow up period had a remarkable difference, recurrence rate of HIPEC group (N=12, median follow up=11 months) was 8.3% as contrast with recurrence rate of No HIPEC group (N=67, median follow up=43 months) was 54.4%. In univariate & multivariate analysis, only histologic type had an effect for oncologic outcome ( $p=0.002, 0.014$ ).

**Conclusions/Discussion:** This study reports that PMCA has poorer prognosis than DPAM. In treatment, systemic chemotherapy has not effect on PMP. And there are no results of long term survival about HIPEC, we expect that HIPEC is good treatment option for improvement of oncologic outcome, so we will need further study to demonstrate this thing.

**UNIVERSAL SCREENING FOR DETECTION OF LYNCH SYNDROME: PRELIMINARY EXPERIENCE AT CLINICA LAS CONDES.**

P617

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**Purpose/Background:** Traditionally, individuals suspicious of Lynch Syndrome have been selected according to the Amsterdam and Bethesda clinical criteria. Nowadays, the implementation of microsatellite instability (MSI) and/or immunohistochemistry (IHC) for MLH1, MSH2, MSH6 and PMS2, is being promoted to assess the MMR system function for all colorectal cancer. Universal screening would increase the sensibility for mutation detection and enlarge the group of high risk families, taking into account those who were discarded for not meet traditional criteria. To determinate the incidence of cases suspicious of Lynch Syndrome trough the implementation of MSI and IHC studies in patients who do not fulfill traditional criteria.

**Methods/Interventions:** We included colorectal cancer patients treated by surgery without neo-adyvant treatment with chemo/radiotherapy, who do not fulfill Amsterdam and Bethesda criteria. Cancer specimens were studied by

MSI and IHC. In those tumors with MLH1 expression loss, MLH1 promoter methylation and BRAF V600E mutation were analyzed to discard sporadic cases.

**Results/Outcome(s):** In total, 83 patients have MSI and IHC information. MSI-High was detected in 11 tumors (13%), all of them with expression loss of at least one protein. Specifically, 9 tumors showed MLH1 loss, the majority of them, PMS2 loss as well. In this group, one case suspicious of LS was identified (unmethylated MLH1 and normal BRAF), corresponding to a 54 years old right colon cancer patient without family history. Besides, two more cases were identified; one with MSH2/MSH6 heterodimer expression loss and other one with PMS2 loss, both patients diagnosed with right colon cancer at 62 and 61 years old without family history. On the other hand, a 49 years old left colon cancer patient with a MSH6 loss was identified in the group with MSS/MSI-Low tumors. Germline mutations screening in two patients revealed the existence of a *MLH1* mutation c.2041G>A (p.Ala681Thr) in one patient.

**Conclusions/Discussion:** In summary, with the routine implementation of MSI and IHC, we could identify 4 cases (4,8%) that do not fulfill the traditional clinical criteria (Amsterdam and Bethesda)

**P616 Analysis of effective factors to overall survival**

	Univariate analysis	Multivariate analysis
Sex	0.265	
Age	0.093	
ASA classification	0.323	
Treatment	<0.001	0.43
Histologic type	0.161	
Histologic type(DPAM vs. PMCA)	0.002	0.014
Disease extent	0.605	
Chemotherapy	0.1	
Symptoms	0.342	
HIPEC	0.189	
Primary site	0.647	
Resection status	0.848	
Complication	0.573	
Preoperative CEA	0.581	
Preoperative CA 19-9	0.22	
Preoperative CA 125	0.787	
Postoperative CEA	0.263	
Postoperative CA 19-9	0.007	0.121
Postoperative CA 125	0.128	
Recurrence	0.446	
Transfusion	0.193	
Operation time(hour)	0.551	
Intraoperative bleeding(ml)	0.63	

### LOCALLY ADVANCED CAECAL CANCER : AN OPPORTUNITY FOR NEO-ADJUVANT THERAPY?

P618

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**Purpose/Background:** Achieving a complete resection of colorectal cancer (R0) is essential for long-term disease-free survival. Predicting which patients might be at risk of an incomplete resection (R1) could provide opportunity for neoadjuvant treatment which forms part of the treatment algorithm for rectal cancer but is rarely used in colonic cancer for fear of small bowel injury. Volume-Modulated Arc Radiotherapy (VMAT) continuously reshapes and modulates the intensity of the radiation beam as the machine rotates around the patient and could be utilised for targeted neo-adjuvant treatment of advanced caecal cancer. Our aim was to investigate the cause of R1 caecal resections to see if this could be predicted preoperatively.

**Methods/Interventions:** We retrospectively analysed the pathology reports of all caecal resections undertaken at a tertiary referral centre between Feb 2011 and Feb 2015. R1 resections of the caecum were identified. Demographic and operative details were collected from patients paper and electronic case notes, including presentation, pre-operative radiological staging, surgical approach, histopathological staging, site of involved margin and any adjuvant treatment undertaken. Outcome and survival were also analysed.

**Results/Outcome(s):** Of a total of 215 patients undergoing right hemicolectomy for caecal cancer, 21 of which had an incomplete (R1) resection (10%). Mean age of patients was 73.2yrs (range 52-91). Eleven patients (52%) presented as an emergency, six with tumour perforation and five with obstruction. Fourteen tumours (67%) were staged as T4 on preoperative imaging, 15 (71%) had nodal disease and 8 (38%) had distant metastases. R1 resection was due to tumour involvement in the posterior (non-peritonealised) margin in 20 patients (one case <1mm) and one case had involvement at the anterolateral margin. Nine patients had an ileostomy formed at initial surgery and 9 patients required further procedures for complications including anastomotic leak, small bowel

obstruction and hydronephrosis. At a mean of 31 months follow-up (range 6-46 months), 16 (64%) patients had died (7 patients within 1 year, 11 patients within 2 years and none surviving longer than 3 years). In the 10 elective cases, preoperative imaging revealed one patient had local perforation, one tumour was invading the sigmoid colon and 5 patients had metastatic disease, leaving only 3 patients who might benefit from neoadjuvant VMAT.

**Conclusions/Discussion:** In this single centre series, incomplete resection of caecal cancer occurred rarely but was associated with poor prognosis. The commonest site for involvement was the posterior margin and most cases occurred in the emergency setting due to tumour perforation or obstruction due to locally advanced disease.. For elective patients with locally advanced disease on pre-operative imaging, neoadjuvant radiotherapy might be indicated, but numbers will be limited.

### OPTIMAL TREATMENT STRATEGIES FOR RECTOVAGINAL FISTULA AFTER SPHINCTER SPARING RECTAL CANCER SURGERY.

P619

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**Purpose/Background:** Rectovaginal fistula (RVF) after sphincter sparing surgery for rectal cancer is regarded as a type of anastomotic leakages. The incidence is rare and few studies have been reported. In addition, treatment strategies for RVF are not established yet. The aim of this study was to evaluate clinical features of RVF and to find the optimal treatment strategies for RVF.

**Methods/Interventions:** All female patients who underwent sphincter sparing surgery with colorectal anastomosis or coloanal anastomosis for rectal cancer between 1997 and 2015 (n=1281) were retrospectively analyzed. RVF was diagnosed by clinical manifestations, colonoscopy or radiology. The patients' demographics and perioperative outcomes were analyzed. We categorized the treatment methods in 5 groups (primary repair without diverting stoma, primary repair with diverting stoma, re-do coloanal anastomosis without diverting stoma, re-do coloanal anastomosis with diverting stoma and palliative colostomy), then compared the success rate of each treatments.

**P619 Procedures performed in patients with rectovaginal fistulas**

Procedures	Frequency	Completion of treatment	Success rate
Primary repair without stoma	8	2	25%
Primary repair with stoma	18	5	27.8%
Re-do CAA without stoma	4	4	100%
Re-do CAA with stoma	8	5	62.5%
Palliative colostomy	4		

CAA, coloanal anastomosis

**Results/Outcome(s):** A total 26 female patients experienced RVFs during that period. The incidence of RVF was 2.02%, comparable with other study. Among these patients, the proportion of patient who was received neoadjuvant chemoradiation was 38.5% (10 of 26). And the median onset of symptom was 118 days after primary cancer operation (range 12 - 2236). A total of 42 procedures were performed in 26 patients with RVF. Except 4 procedures of palliative colostomy, re-do coloanal anastomosis with or without diverting stoma revealed higher success rate than primary repair with or without stoma (re-do coloanal without stoma 4 of 4, 100%, re-do coloanal with stoma 5 of 8, 62.5%, primary repair without stoma 2 of 8, 25%, primary repair with stoma 5 of 18, 27.8%).

**Conclusions/Discussion:** This study's findings suggest that re-do coloanal anastomosis might be considered as a successful treatment strategy for RVF. Further large cohort study is needed to evaluate the risk factors and to establish the optimal treatment for RVF.

#### DOES THE TYPE OF FIXATIVE SOLUTION CORRELATE TO LYMPH NODE YIELD IN LEFT COLON CANCER? A RANDOMIZED TRIAL COMPARING FORMALIN AND CARNOY.

P620

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**Purpose/Background:** Lymph node yield is crucial for patient's prognosis after surgery. Imagine that in time consuming surgeries with adequate lymphadenectomies could retrieve less than an expected number of lymph nodes impairing patient's prognosis just due to routine histopathology analysis loss is unacceptable. Small lymph nodes are difficult to identify, and fat-clearing solutions have been proposed to improve this, but there is no evidence of their clinical benefit. Objective: To analyze the influence of the fixative solution in lymph node count, positivity and its clinical relevance in left colectomy.

**Methods/Interventions:** After Institutional Review Board approval, 60 patients with left colon cancer located either in the sigmoid colon, recto-sigmoid junction or upper rectum operated at the Cancer Institute of the State of São Paulo (ICESP) between march 2012 and September 2013 were randomized 1:1 for fixation with Carnoy's solution (CS group) and 10% neutral buffered Formalin (NBF group). All patients underwent the same type of surgical procedure, which was the left colectomy with colorectal anastomosis. Specimens were fixed then the pericolic fat was weighted, measured and manually dissected for LNs. Pathological analysis was performed accordingly to the College of American Pathologists protocol. After dissection, the residual fat from the NBF group was immersed and fixed in CS and dissected in search for missed LNs

(Revision group). Data from this analysis was added to the NBF group providing the NBF+Revision group. Five colorectal surgeons operated all cases and one pathologist was responsible for weighting, measuring and dissecting all specimens.

**Results/Outcome(s):** Immersion time at the solutions ( $p=0.78$ ) and time for dissection ( $p=0.96$ ) were similar for CS and NBF groups. However, time for immersion and dissection at the Revision Group was double the other groups ( $p<0.001$ ). The mean number of examined LNs was 35.6 and 26.8 for CS and NBF, respectively ( $p=0.007$ ). Missing LNs of NBF reviewed by CS were found in all cases from the residual fat group (mean of 32.2), and in 2 of them (6.7%) metastatic lymph nodes were present. There was no upstaging, but 3 cases (10%) that had less than 12 LNs harvested ended with a satisfactory number of LNs after revision. Lymph nodes in the CS group were smaller than those in the NBF group ( $p<0.001$ ). The number of retrieved LNs was significantly higher when comparing Revision group (45.8) with CS group (35.6;  $p = 0.004$ ).

**Conclusions/Discussion:** Compared with NBF, CS increases lymph node detection following left colectomy for cancer and allows a more accurate pathological staging, especially for smaller lymph node retrieval. Double solution fixation with Formalin and Carnoy is even more accurate, despite a more time consuming process.

#### DEHYDRATED HUMAN AMNION CHORION MEMBRANE IN BOWEL ANASTOMOSES.

P621

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**Purpose/Background:** Anastomotic leaks following colorectal surgery represent a significant postoperative complication with devastating if not lethal consequences. This complication is associated with severe morbidity and mortality. Large patient series have demonstrated that this event can occur in as much as 7 to 14% of bowel anastomoses. Although there is much literature regarding the risks factors and consequence of this complications, few attempt have been using adjunct techniques to ameliorate this problem. The aim of this study was to evaluate the use of dehydrated human amnion and chorion membrane (dHACM) to reduce the incidence of this complication.

**Methods/Interventions:** A systematic review was made of a single surgeon's experiences utilizing dHACM to wrap his colonic anastomoses at the time of primary surgical repair. Eighty two of patients underwent colonic resections with anastomoses wrapped in dHACM. The leak rate was then compared to the surgeon's historic leak rate prior to the use of dHACM.

**Results/Outcome(s):** Approximately 40 patients developed anastomotic leak in over 1000 surgeries prior to the adoption of dHACM wrapping of the anastomosis for an

estimated leak rate of 4.0%. One of patient developed anastomotic leak in eighty-two of surgeries where dHACM wrapping of the anastomosis was used for a leak rate of 1.21%.

**Conclusions/Discussion:** DHACM appears to significantly reduce the number of anastomotic leaks in colon resection surgery and can therefore reduce the prolonged length of stay and/or the need for readmission in these patients.

**DEFERRAL OF SURGERY IN RECTAL CANCER: OUTCOMES FROM OXFORD.**

P622

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**Purpose/Background:** Numerous modalities are utilised in the treatment of rectal cancer, most incorporating surgical resection and, when necessitated, chemoradiotherapy. The exact approach is dictated by a combination of disease- (e.g. tumor stage/involvement of the circumferential resection margin) and patient- (e.g. comorbidity) related factors. The standard of care for curable disease is still surgical resection. However, in recent years, interest has been growing in non-operative management of rectal cancer: ‘*watch and wait.*’ Benefits of this approach are that patients may avoid undergoing surgery that can lead to major morbidity and mortality, risk of needing permanent stoma and a detrimental impact on quality of life due to poor function. However, it is essential that this approach is scrutinised in terms of outcomes and also in relation to the decision making process that leads to deferral of surgery. The purpose of this study is to investigate: (1) rationale for selecting to defer surgery; and (2) outcomes in this cohort in terms of recurrence, and survival.

**Methods/Interventions:** Data was obtained from a prospectively maintained cancer database within a tertiary referral teaching hospital. Patients who underwent chemoradiotherapy and subsequent deferral of surgery for rectal cancer between March, 2011 and January, 2015 were included. Those with metastatic disease were excluded. Tumour characteristics and where available, reason for selection of deferral of surgery was recorded. Mortality and length of follow up was also reported.

**Results/Outcome(s):** From our prospectively maintained database, 24 patients with adenocarcinoma of the rectum underwent deferral of surgery. Age (years) was 72 (50 – 91) [median (range)] at time of diagnosis. Tumour characteristics are noted in Table 1. Of this cohort, four were unfit for surgery and only suitable for non-operative treatment. Six patients declined resectional surgery. Three patients also underwent contact radiotherapy post chemoradiotherapy. Transanal Endoscopic Microsurgery (TEMS) was undertaken in two cases for resection of residual disease post chemoradiotherapy. One patient underwent TEMS resection of recurrence. Overall, mortality was 7/24. Length of follow up (months) was 32 (11 – 56) [median (range)]. Disease relapse was noted in 8/24 and this occurred at 16 (7 – 34) months [median (range)].

**Conclusions/Discussion:** This study demonstrates that a subset of patients with rectal cancer develop a complete clinical response to neoadjuvant chemoradiotherapy. There are numerous reasons why this approach may be taken such as patient fitness for surgery and patient choice to avoid resectional surgery and potential permanent colostomy. Furthermore, techniques such as TEMS may have a role in the treatment of persistent or recurrent disease in certain cases. Accordingly, deferral of surgery and organ preservation in selected patients may obviate the need for radical surgery and the ensuing morbidity and impact on quality of life.

**ANALYSIS OF ADHERENCE TO A MULTICENTER COLORECTAL CANCER SCREENING PROGRAM IN A DEVELOPING COUNTRY.**

P623

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**Purpose/Background:** In developed countries application of colorectal cancer (CRC) screening programs (CRCSP) reduces mortality. However, in countries with limited resources an important issue is the cost and low adherence. In Chile a CRCSP with standardized protocols (PRENEC) is being developed, including education and

**P622 Tumor characteristics**

T Stage	Number of Patients	N Stage	Number of Patients	Height of Tumor	Number of Patients
1	2	0	15	Low	16
2	9	1	5	Mid	7
3	8	2	3	Upper	1
4	4				

One patient unable to have MRI staging



personalized orientation of the participants. To analyze the adherence of PRENEC participants.

**Methods/Interventions:** We select a cohort of patients from PRENEC project. Inclusion criteria: age between 50 and 75 years, asymptomatic for colorectal disease. An immunological occult blood test (FIT) was performed on all patients; on those with positive results, a total colonoscopy was performed. Period of study: July 2012 - August 2016. Adherence to program, FIT, colonoscopy and permanence at 2 years were analyzed

**Results/Outcome(s):** In mentioned period, there were 20,889 people interested and 19,129 (91.6%) attended. The participants who returned the FIT were 93% (17,695/19,129). The FIT return was 94%, 97% and 89% in centers 1, 2 and 3, respectively. Those with positive FIT (2,476 individuals), 2,228 (89,9%) were scheduled to a colonoscopy, which was performed in 2,045 (82.5%). Colonoscopies were performed in 85%, 89% and 77% in centers 1, 2 and 3, respectively. There were 8,782 patients with negative FIT and indication to repeat it at 2 years; of those patients 6,239 (71%) have been contacted and a total of 3,987 individuals (64%) have withdrawn their second FIT.

**Conclusions/Discussion:** Adherence to the PRENEC program is above the one referred to in international series, probably due to the influence of education and personalized orientation, which may positively impact results and cost-effectiveness in the future.

## ANASTOMOTIC LEAKS IN MALIGNANT COLORECTAL RESECTIONS.

P624

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**Purpose/Background:** Anastomotic leaks is a serious complication that is reported to occur in < 10% of restorative colorectal surgery. Anastomotic leaks is believed to adversely affect long term survival. The aim of the study is to assess the management of colorectal anastomotic leaks at a single centre.

**Methods/Interventions:** This is a retrospective study carried out at East Cheshire NHS Trust from November 2008 to November 2016. Patient factors and post-operative features were collected for malignant colorectal resections with anastomotic "leaks" and "non-leaks" were recruited as controls.

**Results/Outcome(s):** Anastomotic leaks (n=48), Non Leaks (n=964). Mann Whitney U test (p value) Age (yrs): 68.4±1.5 (leaks), 71.1±0.4 (non leaks). p=NS. Sex (M:F): 28:20 (leaks), 523:441 (no leaks) p=NS. BMI: 26.7±0.7 (leaks), 26.4±0.5 (non leaks) p=NS. Emergency: Elective (n): 9:39 (leaks), 218: 746 (non leaks). Laparoscopic:Open (n): 16:32 (leaks),

447:517 (non leaks) Type A (antibiotic Rx) leaks (n): 20 Type B (drainage Rx) leaks (n): 6 Type C (surgical Rx) leaks (n): 22 Operation time (mins): 155.2±9.2 (leaks), 161.0±2.3 (non leaks) p=NS. Lymph Node yield (n): 14.5 (leaks), 14 (non leaks) p=NS. Length of stay (days): 13±6.5 (leaks), 9±4 (non leaks) p<0.0005 1st year survival (%): 84.9, 87.7 (non leaks) Logrank p=NS 3rd year survival (%): 74.2, 75.0 (non leaks) Logrank p=NS 5th year survival (%): 68.3, 67.8 (non leaks) Logrank p=NS

**Conclusions/Discussion:** Anastomotic leaks occurred in 4.7 % of all CRC resections, surgical intervention was carried out in 45.8 % cases. Despite a prolonged hospital stay (p < 0.05), anastomotic leaks did not adversely affect patient survival (Logrank p = NS). Type C leaks are believed to have the worst prognosis (recurrence & shorter survival). Diversion stoma reduces the rate & severity of anastomotic leakage. Early diagnosis is crucial in the management of anastomotic leaks.

## LAPAROSCOPIC CONVERTED TO OPEN COLORECTAL RESECTIONS FOR MALIGNANCY.

P625

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**Purpose/Background:** Colorectal cancer is the 3<sup>rd</sup> most commonest and the 2<sup>nd</sup> most lethal malignancy in the UK & USA. Laparoscopic surgery has evolved to become routinely employed in the management of colorectal malignancies. Laparoscopic to open conversion has been reported to occur in less than 21 % of cases. The aim of the study is to assess laparoscopic to open conversions at a single centre.

**Methods/Interventions:** This is a retrospective study carried out from November 2008 to November 2016 at East Cheshire NHS Trust. Patient factors & surgical outcomes were evaluated for all elective colorectal resections. Laparoscopic and open colorectal resections carried out during same period were recruited as controls.

**Results/Outcome(s):** Lap-open (n=66), Laparoscopic (n=276), open (n= 351). Kruskal Wallis test (p value). Age: (yrs): 70.2±1.4(lap-open), 70.5±0.6(lap), 71.8±0.6(open) p=NS Sex (M: F): 44:22(lap-open), 200:178(lap), 204:147(open) p=NS ASA: 2(lap-open), 2 (lap), 2(open) p=NS BMI: 27.0±0.6(lap-open), 25.9±0.2(lap), 27.1±0.3(open) P<0.05 Operation time (mins): 204.7±8.4(lap-open), 187.5±3.7(lap), 142.5±3.5(open) p=NS Lymph Node yield (n): 14(lap-open), 15(lap), 15(open) p=NS Length of stay (days): 9±4(lap-open), 7±3.5(lap), 10±3(open) p=<0.05 1st year survival (%): 96.7(lap-open), 94.0(lap), 89.8(open) Logrank p=NS 3rd year survival (%):

85.1(lap-open), 85.7(lap), 77.4(open) Logrank p=NS  
**5th year survival (%)**: 77.7(lap-open), 78.5(lap), 72.2(open) Logrank p=NS

**Conclusions/Discussion:** The total lap-open conversions rate was 14.9 %, but has dropped to 7.5% for the year 2015. Lap-open conversions were more common in men ( $p < 0.05$ ), of higher weight & BMI ( $p < 0.05$ ). Lap-open conversion was associated with a prolonged operative time ( $p < 0.05$ ), & a longer hospital stay ( $p < 0.05$ ), but did not adversely affect survival. Lap-open conversion occurred in the presence of: significant intra-abdominal adhesions, fatty mesentery or omentum, unfavourable patient habitus (i.e. narrow pelvis in men & presence of uterine fibroids in women), technical difficulties, equipment failure, tumour fixity, other visceral involvement, intra-operative events (e.g. bleeding), concerns of anastomotic viability, & anaesthetic compromise (ventilation difficulties). Conversion should not be deemed as failure of laparoscopic surgery, but as sound safe surgical decision.

### TRANSANAL TOTAL MESORECTAL EXCISION AS EARLY ADOPTERS: A MOVE IN THE RIGHT DIRECTION?

P626

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**Purpose/Background:** Transanal TME (taTME) is the latest advanced technique pioneered to overcome challenges encountered during difficult pelvic dissections. It's adoption and interest is growing worldwide and initial cohort series and registry data such taTME to be oncologically safe with acceptable short-term clinical outcomes. We report our TaTME experience as early adopters in a single unit applying modifications to the technique and adapting the approach to other indications such as abdominoperineal excisions and completion proctectomies.

**Methods/Interventions:** Data on consecutive TaTME cases performed at a single colorectal unit in Oxford were recorded prospectively. Patient characteristics, operative details and both histological and short-term clinical outcomes were analysed. Modifications to the technique and equipment used are described. TaTME results were compared to laparoscopic TME cases performed in the same unit.

**Results/Outcome(s):** Since June 2013, 65 patients underwent TaTME: 55 cancer and 10 benign cases. Procedures included 27 low anterior resections, 15 ultralow anterior resections, 10 extralevator abdominoperineal excisions (APE), 7 intersphincteric APE, 3 completion proctectomies, 2 proctectomies with ileal-pouch anal anastomosis formation and 1 standard APE. Mean BMI was 27.4 kg/m<sup>2</sup> with 77% men and median age of 63-years. Median tumour height from anal verge was 5.5±2.6cm.

56% and 29% of tumours were T3 and T2 respectively. Intra-operative difficulties encountered included bleeding (4 patients), unstable pneumopelvis with poor visualisation due to smoke (8), and incorrect plane dissection (8). Urethral injury did not occur. Introduction of a specialised transanal platform and Airseal insufflation system improved the pneumopelvic stability and view. A modified stapling technique to ensure central placement of the anvil through the rectal pursestring was devised. Post-operative complications included one wound infection, three urinary retentions, one pneumonia and five prolonged ileus. Anastomotic leak occurred in 3 patients (6.8%), all of whom had stapled anastomoses and underwent examination under anaesthesia and transanal control of pelvic sepsis with closure of the anastomosis. The anastomotic leak rate following anterior resection by an abdominal approach was 10.9% and laparotomy for leakage was required in 5.6% of cases. One patient in the taTME series died of metastatic disease five months following surgery. The 30-day mortality rate for the abdominal approach group was 2.1% (n=6). Histological results show complete or near complete TME specimens in 98% of cases with a negative circumferential margin in 98%.

**Conclusions/Discussion:** Despite early taTME adoption with subsequent technical and instrumental modifications during the initial cases, the short-term histological and clinical outcomes achieved appear to be comparable, and possibly superior in terms of anastomotic leak rate, to traditional abdominal approaches.

### STREAMLINING REFERRALS FOR PATIENTS WITH SUSPECTED COLORECTAL CANCER.

P627

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**Purpose/Background:** In the UK, patients with suspected colorectal cancer meeting set criteria, are referred by a primary care physician on a Government led '2 week wait' pathway, necessitating them to be seen within 14 days of referral. Traditionally this had meant office review prior to investigation, however has resulting in considerable burden and struggle to meet targets. Based upon this, our centre developed a fully protocol driven 'straight to test' pathway in November 2015 based upon patient fitness (WHO performance status) and referring symptom. The aim of this study was to review our initial experience with this.

**Methods/Interventions:** We retrospectively reviewed our results over the first seven months of implementing this pathway (November 2015-May 2016). Patients with rectal bleeding or a palpable rectal mass underwent flexible sigmoidoscopy; change of bowel habit >60 years underwent CT colonography; iron-deficiency anaemia >60 years underwent CT colonography and gastroscopy;

abdominal mass in any age or abdominal pain and weight loss >40 years underwent CT abdomen and pelvis. Data were analysed focusing on symptomatology, modality of investigation and cancer pick up rate.

**Results/Outcome(s):** 1996 patients were referred during this period (285/month). 14-day target was achieved in 93%. 90% went straight to investigation, with the other 10% being seen in clinic due to fitness - of these, 29% were ultimately not investigated as unfit. Overall, 1941 patients were investigated, with cancer diagnosed in 6.6% (81% colorectal). 950 patients underwent CT colonography; 695 flexible sigmoidoscopy and 127 CT abdomen/pelvis. Colorectal cancer pick up rate by presenting complaint was as follows: Rectal mass 19%; abdominal mass 14%; weight loss and abdominal pain 12%; rectal bleeding 6%; iron-deficient anaemia 4%; change in bowel habit 3%.

**Conclusions/Discussion:** This pathway has allowed us to achieve our referral targets. Whilst on face value it does seem to create considerable workload, it allows patients to be investigated in a timely fashion and avoid the burden of office appointment prior to investigation. A notable number of important incidental findings have also been identified in the investigation process.

#### LAPAROSCOPIC AND OPEN ANTERIOR RESECTION FOR RECTAL CANCER.

P628

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**Purpose/Background:** For rectal cancers, Anterior Resection (AR) offers sphincter preserving surgery. AR has comparable oncological results & improved quality of life than patients undergoing APR / Hartmann's operation. Progress in rectal resection surgery techniques (e.g. laparoscopy, use of mechanical stapling devices) have allowed laparoscopic AR to become more widely available. The aim of this study is to evaluate laparoscopic AR carried out at single institution.

**Methods/Interventions:** This is a retrospective study carried out from November 2008 until November 2016 at East Cheshire NHS Trust. Patient factors & surgical outcomes were evaluated for all laparoscopic Anterior Resections. All Open anterior resections carried out since 2008 were recruited as controls.

**Results/Outcome(s):** Laparoscopic AR (n=135), Open AR (n=104) (Mann Whitney U test, p value) Age (yrs): 67 (lap AR), 70.9 (open AR). p=NS Sex (M:F): 86: 49 (lap AR), 58:39 (open AR). p=NS BMI: 26.8 (lap AR), 26.5 (open AR). p= NS Operation time (mins): 230.3 (lap AR), 166.3 (open AR).p<0.05 High AR (>12cm): 81 (lap AR), 49 (open AR). Low AR (6-12cm): 50 (lap AR), 47 (open AR). Ultra low AR (<6cm): 4 (lap AR), 8 (open AR). Loop ileostomy (n): 42 (lap AR), 39 (open AR). p=NS LN harvest (n): 14 (lap AR), 14

(open AR). p=NS LOS (days): 7 (lap AR), 10 (open AR). p<0.05 Lap-open conversions (n): 21 (15.6 %). Type A (antibiotic Rx) leaks: 2 (lap AR), 6 (open AR). Type B (drainage Rx) leaks: 2 (lap AR), 0 (open AR). Type C (surgical Rx) leaks: 4 (lap AR), 6 (open AR). 1st year survival (%): 95.9 (lap AR), 94.2 (open AR). Logrank p =NS 3rd year survival (%): 88.8 (lap AR), 86.0 (open AR). Logrank p =NS 5th year survival (%): 78.2 (lap AR), 75.8 (open AR). Logrank p =NS

**Conclusions/Discussion:** Laparoscopic AR was associated with prolonged operation time (p< 0.05), equivalent LN yield (p =NS), a shorter hospital stay (p < 0.05), but an equivalent survival (Logrank p = NS) as compared to open AR. Anastomotic leaks occurred in 5.9 % in lap AR & 10.5 % in open AR (with 50% requiring surgical intervention in both cases). Lap – open conversions occurred in 17.2%, and causes include: omental adhesions, fatty omentum & mesentery, bleeding, difficult pelvic dissection (especially in males), concerns of anastomotic viability, and difficult tumour localization.

#### LOCAL VS RADICAL EXCISION OF LOW RECTAL CANCERS: AN ANALYSIS OF THE NATIONAL CANCER DATABASE.

P629

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**Purpose/Background:** Local excision (LE) for T1 distal rectal cancers has been shown to provide similar efficacy with less morbidity as compared to abdominoperineal resection (APR). Small trials have shown similar efficacy for LE and radiation for well selected T2 distal cancers. We investigated outcomes of each approach in T1 and T2 distal cancers using the National Cancer Database (NCDB).

**Methods/Interventions:** The NCDB was interrogated for all rectal cancers from 2004 to 2013 (219,516 cases). Of these, 9181 patients with pathologic T1N0 and T2N0 adenocarcinoma who underwent either LE or APR with negative margins were included in the study. For patients with T1 tumors, analysis was limited to those who did not receive radiation. For patients with T2 tumors, treatment groups consisted of local excision with radiation (LE+RT) compared to APR without radiation. Chi square and Wilcoxon rank-sum tests were used for bivariate analyses of categorical and continuous variables, respectively. An adjusted Cox Proportional-hazards model was used to evaluate the impact of treatment strategy on survival.

**Results/Outcome(s):** Patients were divided into groups according to pathologic staging of T1N0 and T2N0. Each pathologic group was stratified by treatment strategy. Of the 2271 T1N0 patients, 1538 and 733 underwent LE and APR, respectively. Of the 1968 T2N0 patients,

431 and 1537 underwent LE+RT and APR respectively. The majority of patients in both groups was older, white, insured, and had low co-morbidity scores. Poorly or un-differentiated tumors were uncommon in both groups. Characteristics and outcomes of each group are presented in Table 1. In unadjusted analysis, the hazard ratio (HR) for death was lower for APR than LE for patients with T1N0 disease (HR 0.83, 95%CI 0.70-0.99,  $p=0.04$ ) and for APR than LE+RT for patients with T2N0 disease (HR 1.21, 95% CI 0.01-1.45,  $p=0.04$ ). However, after adjusting for age, sex, Charlson score, race, payor type, tumor size and grade, no survival advantage was seen for APR over LE strategies in either T1N0 (HR 0.85, 95%CI 0.69 – 1.06,  $p=0.156$ ) or T2N0 (HR 1.14, 95%CI 0.92 – 1.41,  $p=0.25$ ) disease. In a subset analysis of 996 T2N0 patients with well or moderately differentiated tumors less than 4 cm, there was no survival difference between LE+RT and APR (HR 1.11 95%CI 0.85-1.44,  $p=0.44$ ).

**Conclusions/Discussion:** In this large dataset, LE and APR achieved equivalent survival outcomes for T1N0 cases when adjusting for confounders. LE+RT also achieved equivalent survival outcomes to APR for T2N0 cases after adjustment. While LE is an established acceptable treatment strategy for T1N0 tumors, these findings support prior results that LE+RT may also be considered

in well-selected patients with T2N0 tumors. It is important to note that approximately half of the possible study patients were excluded from analysis due to treatment that did not meet the standard of care for rectal cancer.

#### INDOCYANINE GREEN FLUORESCENCE ANGIOGRAPHY FOR LOW ANTERIOR RESECTION: RESULTS OF A COMPARATIVE COHORT STUDY.

P630

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**Purpose/Background:** Anastomotic leak (AL) after low anterior resection is associated with increased morbidity, mortality, cost and cancer recurrence rates. Inadequate intestinal blood perfusion is one of the major risk factors for AL. Fluorescence angiography (FA) with Indocyanine Green (ICG) can aid in assessing the adequacy of perfusion and hence, potentially, reduce leak rates. The aim of this study was to evaluate the impact of FA on AL following low anterior resection for rectal cancer.

**P629 Table 1. Characteristics and Outcomes of Study Patients**

Variable (a)	pT1N0			pT2N0		
	LE (b) N=1538	APR (c) N=733	P	LE + RT (d) N=431	APR N=1537	P
Median Age, Range (yrs)	67 [57-90]	66 [55-75]	0.01	67 [57-76]	71 [61-79]	<0.01
Male Sex (N, %)	888 (58)	444 (61)	0.20	244 (57)	905 (59)	0.40
Charlson-Deyo Co-morbidity Score (N, %)						
0	1194 (78)	548 (75)		341 (79)	1054 (69)	
1	268 (17)	137 (19)		69 (16)	353 (23)	
2	76 (5)	48 (7)	0.19	21 (5)	130 (8)	<0.01
Median Tumor Size, Range (mm)	15 [9-25]	20 [11-30]	<0.01	26 [19-35]	35 [25-45]	<0.01
Tumor Differentiation (N, %)						
Well	309 (20)	96 (13)		35 (8)	138 (9)	
Moderately	958 (62)	507 (69)		313 (73)	1193 (78)	
Poorly	92 (6)	66 (9)		50 (12)	148 (10)	
Undifferentiated; anaplastic	2 (0.1)	10 (1)		2 (0.5)	12 (1)	
Unknown	177 (12)	54 (7)	<0.01	31 (7)	46 (3)	<0.01
30-day mortality (N,%)	8 (0.5)	8 (1.1)	0.13	1 (0.2)	36 (2.3)	<0.01
90-day mortality (N, %)	22 (1.4)	17 (2.3)	0.14	7 (1.6)	58 (3.8)	0.03
Median Length of Follow-Up, [Range] (Months)	54 [28-81]	60 [31-86]	0.02	61 [35-85]	50 [26-82]	<0.01
Alive at Last Follow-Up (N, %)	1128 (73)	558 (76)	0.16	284 (66)	980 (64)	0.41

a Percentages may not sum to 100 due to rounding.

b LE = local excision

c APR = abdominoperineal excision

d LE + RT = local excision and radiation therapy

**Methods/Interventions:** This is a single surgeon (SDW) retrospective cohort study with a historical, consecutively sampled propensity matched control group. The institution's prospectively maintained IRB-approved database was queried for all patients who underwent a laparoscopic low anterior resection for rectal cancer with a colorectal or coloanal anastomosis <5 cm from the anal verge between 2014 and 2016. Patients were grouped between those individuals in whom FA was employed (study group; 2015-2016) and those patients in whom it was not used (control group (CG); 2014-2015). All patients were diverted with a loop ileostomy. The primary outcome measured was the anastomotic leak rate and a secondary outcome measured was change in surgical plan following FA.

**Results/Outcome(s):** Sixty patients were included in the study: 30 patients in the FA group and 30 patients in the CG. Patient demographics (age, gender, body mass index), the use of neo-adjuvant chemoradiation, and tumor stage were comparable between the study groups. The mean height of anastomosis was 2.7 cm from AV in the FA group and 2.9 cm from AV in the control group ( $p=0.48$ ). More patients in the control group required intra-operative vasopressors (46.7% vs. 13.3%,  $p=0.005$ ) and more commonly had a colonic J-pouch anastomotic configuration (73% vs. 48%,  $p=0.04$ ). Serosal and mucosal perfusion assessment using FA was technically feasible in 100% of FA group patients. No side effects or allergic reaction related to FA were recorded. FA lead to a change in surgical plan in 4 patients (13.3%) none of whom suffered an AL. Two patients in the CG had an AL confirmed clinically and radiologically whereas none in the FA group had an AL (6.7% vs. 0%,  $p=0.49$ ).

**Conclusions/Discussion:** FA changed surgical plan in 13.3% of low anterior resections, potentially reducing the incidence of AL in these high-risk patients.

#### INTEGRATED PET/MRI IMAGING BIOMARKERS TO PREDICT HISTOLOGICAL TUMOUR REGRESSION AND 3-YEAR DISEASE FREE SURVIVAL (DFS) IN LOCALLY ADVANCED RECTAL CANCER (LARC).

P631

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**Purpose/Background:** Tumour response assessment has emerged as an attractive end point in LARC treated with neoadjuvant chemo-radiotherapy (CRT) because it is associated with significantly better survival. This has placed greater emphasis on pre-operative imaging to identify patients predicted to have either worse or better tumour regression grades. The main objective of this prospective study was to investigate whether pre-treatment integrated PET-MR functional features correlated with histological

response in LARC treated with long course CRT. In addition, a potential correlation of PET and functional MRI features in the setting of integrated PET/MRI system and association of clinical, histological and functional imaging parameters with DFS was also evaluated.

**Methods/Interventions:** Pre-treatment integrated PET/MRI was done for the patients with non-metastatic locally advanced rectal cancer stage II and III before undergoing CRT. Quantitative analysis of PET/MRI was performed by measuring maximum SUVs (max and peak) (reflecting metabolic activity of the tumour) and ADC (mean and min) (reflection of tumour cellularity). Univariate Kaplan-Meier survival analysis was employed to identify which clinical (age, sex), pre-treatment MRI (EMVI status, CRM involvement), histopathological (ypT stage, ypN stage, ypCRM involvement, ypEMVI status and pathological responders) and functional PET/MRI parameters predicted DFS.

**Results/Outcome(s):** Total number of patients=16 with 11 (69%) males. Median age=62 years. All the patients completed CRT and underwent curative resection but two patients. One patient had complete clinical response and was treated with wait and watch approach and the second patient died of disease progression. Two patients had complete pathological response. Eleven (69%) patients were categorized as bad responders and 5 patients (31%) as good responders. The rate of both local and distal recurrences was 19%. The overall 3-year DFS was 45%. There was no significant difference between the mean values of PET parameters and DWI parameters (independent sample t test) across the two groups of good and bad pathological responders (Table). Interestingly pre-treatment meanADC was higher in patients with good tumour regression grades but these values are typically higher in poor responders. Non-significant inverse Pearson's correlation coefficients was found between PET and MRI parameters (SUVmax/ADCmean,  $-0.406$   $p=0.150$ ; SUVmax/ADCmin,  $-0.312$   $p=0.278$ ; SUVpeak/ADCmean,  $-0.280$   $p=0.331$ ; and SUVpeak/ADCmin,  $-0.239$   $p=0.410$ ). On Univariate KM survival analysis, only ypN stage significantly predicted worse 3-year DFS ( $P=.025$ ).

**Conclusions/Discussion:** Although the findings of this study lacked statistical power due to the small sample size, we believe that integrated PET MR will allow better intra-lesional characterisation by utilising specific properties of both modalities.

### HOW RELIABLE IS CT SCAN IN STAGING RIGHT COLON CANCER?

P632

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**Purpose/Background:** The improvements in rectal cancer management with adoption of better preoperative radiological staging allowing selective use of preoperative therapy has resulted in superior oncological outcomes when compared to proximal colon cancer. Colon cancer, studies have shown that extensive surgical resection and the use of neoadjuvant chemotherapy may improve oncological outcomes. The purpose of this study was to determine the accuracy of CT staging in detecting unfavorable pathological features that would possibly aid in the selection of ideal candidates with unfavorable pathological features for alternative treatment strategies including extended lymph node dissection and/or neoadjuvant chemotherapy.

**Methods/Interventions:** Trained abdominal radiologists from 2 centers performed a blinded review of CT scans obtained to locally stage proximal colon cancer according to previously defined prognostic groups: T1-2, T3-4, N(+) and EMVI(+). The CT findings were compared with histopathological results as the reference standard. Unfavorable pathological findings included pT3/4, pN+ or pEMVI+.

**Results/Outcome(s):** A total of 150 CT scans were reviewed. CT failed to identify the primary cancer in 19.3% of patients. The overall accuracy of the CT to identify any unfavorable pathological feature was 63% with a sensitivity, specificity, PPV and NPV of 63% (95% CI, 54-71), 63% (95% CI, 46-81), 87% (95% CI, 80-94) and 30% (95% CI, 18-41), respectively. Only cT3/4 (55% versus 45%;  $p=0.001$ ) or cN+ (42% versus 58%;  $p=0.02$ ) were significantly associated with correct identification of any unfavorable features at final pathology. CT scan overstaged and understaged cT in 23.7% and 48.3%, and cN in 28.7% and 53% of the cases.

**Conclusions/Discussion:** The accuracy of CT scan for the identification of pT3/4, pN+ or pEMVI+ was insufficient to allow proper identification of patients at high risk for local recurrence and/or in whom to consider alternative

treatment strategies. In addition locoregional overstaging and understaging of the disease would result in inappropriate treatment strategies in up to 48% of the cases. Alternative preoperative staging modalities are needed.

### CYTOREDUCTIVE SURGERY AND HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY FOR COLORECTAL CANCER: THREE-YEAR EXPERIENCE.

P633

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**Purpose/Background:** The aim of this study is to present single institution cytoreductive surgery (CRS) plus hyperthermic intraperitoneal chemotherapy (HIPEC) experience in patients with peritoneal metastasis (PM) due to colorectal cancer.

**Methods/Interventions:** All patients with PM secondary to colorectal cancer, who underwent CRS with HIPEC between December 2012 and March 2016, were added to this retrospective study. CRS and HIPEC with mitomycin C or oxaliplatin (Sugarbaker's protocol) was performed in all patients. Patient demographics, perioperative and post-operative outcomes were evaluated. Complications were graded according to Clavien-Dindo classification.

**Results/Outcome(s):** A total of 64 patients with PM were found to undergo CRS plus HIPEC during the study period. Of these, 20 (31%) patients (12 females, 8 males) were operated due to colorectal cancer. Nineteen patients had colon cancer and one patient had a rectum cancer. Mean age was  $49.85 \pm 13.5$  years (range, 26-69). American Society of Anesthesiologists score was I, II, and III in one, 18, and one patient, respectively. Mean BMI was  $20 \pm 4.8$  kg/m<sup>2</sup> (range, 17-35). Mean peritoneal carcinomatosis index (PCI) score was  $9.85 \pm 5.2$  (range, 3-26). Cytoreduction score (CCs) of 0 was achieved in 18 patients. However, in two patients, CCs was 1 and 2 due to tumoral infiltration to the sacrum. The peritonectomy was performed selectively in 14 patients, and completely in four of the patients. In two patients peritonectomy was not performed due to absence of parietal peritoneal metastasis. Mean operation time was  $404 \pm 73.2$  min (range, 270-540).

### P631 Comparison of mean values for functional imaging parameters across the two groups of responder and non-responder to neoadjuvant treatment

Variable	Responders (Mean $\pm$ SD)	Non responders	P value (Independent sample t test)
SUVmax	13.73 $\pm$ 4.16	19.2 $\pm$ 6.79	0.164
SUVpeak	10.3 $\pm$ 3.46	13.93 $\pm$ 4.29	0.161
ADCmean	1174 $\pm$ 360.78	1055.76 $\pm$ 137.197	0.346
ADCmax	1707.8 $\pm$ 515.32	1760.36 $\pm$ 364.73	0.817
ADCmin	743.6 $\pm$ 316.71	584.18 $\pm$ 77.93	0.303

Mean operative blood loss was  $645 \pm 669.8$  mL (range, 160-2700). For patients with blood loss more than 500 mL, transfusion of blood products was given. All patients were transferred to the intensive care unit postoperatively. Grade I (wound infection), grade IIIa (abdominal abscess collection), and grade IIIb (intra-abdominal bleeding and anastomotic leak) complications occurred in two, one and three patients, respectively. The mean hospital stay was  $10.45 \pm 5.32$  days (range, 5-23). Pathology results were adenocarcinoma in 10, mucinous adenocarcinoma in seven and signet cell carcinoma in three of the patients. There was no mortality in the early postoperative period. Disease free survival and overall survival rates were  $23.7 \pm 17.4$  (range, 5-60) and  $28.2 \pm 18.5$  (range, 8-60) months, respectively. Long term mortality rate was 25% (n=5). Mean PCI score of the five deceased patients was  $8.8 \pm 4.20$  (range, 6-15).

**Conclusions/Discussion:** CRS combined with HIPEC is a promising modality for a selected group of patients with PM related to colorectal cancer.

#### OPERATIVE OUTCOMES OF RECTAL CANCER IN OCTOGENARIANS AND NONAGENARIANS.

P634

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**Purpose/Background:** Rectal cancer incidence increases with age and life expectancy continues to rise. Healthcare providers face increasingly more elderly patients with rectal cancer. Surgery remains the cornerstone of treatment. Surgeons should give patients up-to-date and relevant information to allow an informed decision and guide treatment. This study aimed to determine if postoperative outcomes for rectal cancer vary based on age.

**Methods/Interventions:** A retrospective review identified patients  $\geq 50$  years who underwent proctectomy for rectal cancer or dysplasia between 2010-2016. Patients were divided into 3 cohorts of 40 consecutive patients: ages 50-64, 65-79, and  $\geq 80$ . Patients with stage IV disease were excluded. Using univariable and multivariable logistic regression, differences in preoperative factors, disease specific factors, intraoperative factors, and postoperative outcomes were examined.

**Results/Outcome(s):** 120 patients (117 with rectal cancer) were included. Baseline characteristics showed statistically significant differences in BMI and ASA class. Average BMI in octo- and nonagenarians was  $24.6 \text{ kg/m}^2$ , significantly lower than patients aged 50-64 (28.5) and 65-79 (26.9) ( $p=0.007$ ). Patients  $\geq 80$  years had a higher average ASA than those  $<80$  ( $p=0.001$ ). Disease-specific factors were similar among groups with no differences in tumor stage or location. Despite the similarities, neoadjuvant therapy was administered in 75% of patients aged

50-64, 60% aged 65-79 and 23% aged  $\geq 80$  ( $p=0.000$ ). Most patients  $<80$  (18/26 aged 65-70 and 24/30 aged 50-64) had neoadjuvant therapy, while a minority of octo- and nonagenarians (9/30) had neoadjuvant treatment ( $p=0.000$ ). Only 35% of patients  $\geq 80$  underwent a restorative procedure vs. 42.5% of 65-79 year olds and 72% of 50-64 year olds ( $p=.002$ ). No difference was found in laparoscopic vs. open procedures in octo- and nonagenarians (42.5 vs. 47.5%). Post-operative complications were more frequent in patients  $>80$  (25% for 50-64, 28% for 65-79 and 50% of  $\geq 80$ ;  $p=0.034$ ). Patients  $\geq 80$  had longer average hospital stay than  $<80$  year olds (12 vs. 8 days;  $p=0.002$ ). Older patients had significantly higher overall infection rates ( $p=0.0003$ ) including higher wound infection rates (23%  $\geq 80$  vs. 6%  $<80$ ;  $p=0.031$ ). However, older patients did not have higher anastomotic leakage rates. 3 perioperative cardiac events were documented in octo- and nonagenarians while none occurred in the other groups. No mortality was noted.

**Conclusions/Discussion:** There are significant differences in baseline characteristics, operative approach, and outcomes for octo- and nonagenarians with rectal cancer vs. younger patients. While higher ASA class and greater comorbidities may explain the reluctance to offer elderly patients neoadjuvant therapy and restorative procedures, further research into preoperative sphincter function and patient-expressed preferences is needed to fully understand these patterns of care.

#### TRANSANAL TOTAL MESORECTAL EXCISION FOR RECTAL CANCER: HIGH RATES OF CHANGE IN SURGICAL MARGIN USING INDOCYANINE GREEN FLUORESCENCE ANGIOGRAPHY.

P635

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**Purpose/Background:** Transanal total mesorectal excision (taTME) is an emerging surgical technique for rectal cancer that might offer technical advantages over laparoscopic or open approaches particularly in the obese, in males, and in patients with low rectal tumors. Anastomotic leak (AL) after TME is associated with increased morbidity, mortality, cost and cancer recurrence rates. Inadequate intestinal blood perfusion is one of the major risk factors for AL. Fluorescence angiography (FA) with Indocyanine Green (ICG) can lead to a change in surgical margin due to inadequate perfusion and hence, potentially, reduce leak rates. The aim of this study was to demonstrate the utility and feasibility of FA for perfusion assessment during taTME and its impact on the change of surgical margin and leak rates.

**Methods/Interventions:** This is a retrospective cohort study conducted at two high volume centers by two surgeons (SDW, AML). Both institutions' prospectively maintained IRB-approved databases were queried for all consecutive patients who underwent a hybrid laparoscopic low anterior resection (LAR) and taTME for rectal cancer with a colorectal or coloanal anastomosis <10 cm from the anal verge between 2015 and 2016. Patients were included in the study only if FA was employed during their surgery. FA was used to assess colonic perfusion at 2 critical timepoints: planned proximal resection margin before bowel transection via laparoscopy and after the construction of the anastomosis via rigid proctoscopy. The primary outcome measured was the change in surgical plan following FA and the secondary outcome measured was the anastomotic leak rate.

**Results/Outcome(s):** Forty-four patients (20- females, 24-males) were included in the study, 23 of whom (52%) received neoadjuvant chemoradiation. The anastomotic height was 3.9 cm from the anal verge. An inter-sphincteric dissection was performed in 8 patients (18%), 22 patients (50%) had a colonic J pouch anastomosis, and 18 patients (41%) had a handsewn anastomosis (41%). A loop ileostomy was constructed in 37 patients (84%). Serosal and mucosal perfusion assessment using FA was technically feasible in 100% of patients. No side effects or allergic reactions related to FA were recorded. FA lead to a change in surgical plan in 10 patients (22.7%), one of whom, who did not have an ileostomy, suffered a clinically proven AL requiring re-operative intervention on the third post-operative day. One other patient, without a change in surgical margin, suffered a radiologically proven AL resulting in a 4.5% (2/44) overall AL rate.

**Conclusions/Discussion:** FA changed surgical plan in 22.7% of taTMEs, potentially helping explain the relatively low 4.5% incidence of AL in these high-risk patients.

#### MULTIGENE HOTSPOT MUTATIONAL PROFILING OF YOUNG VS. LATER AGE-OF-ONSET COLORECTAL CANCER USING NEXT-GENERATION SEQUENCING.

P636

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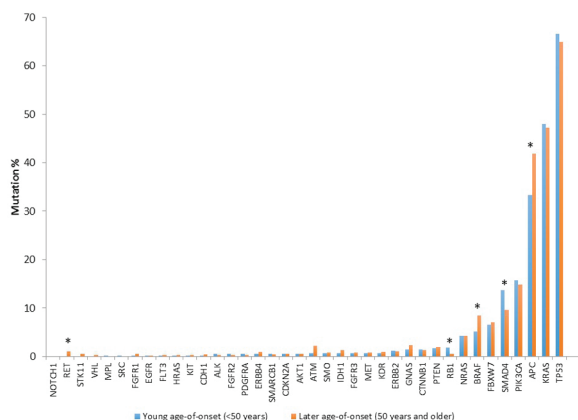
**Purpose/Background:** Colorectal cancer (CRC) is increasing among young adults (aged 18-49) for whom no CRC screening guidelines exist. Young age-of-onset CRC often present with metastatic disease and exhibit aggressive clinical course, and a distinct molecular profile has been hypothesized. We aimed to examine somatic mutation profiles of young (aged 18-49) vs. later (aged 50 and older) age-of-onset CRCs.

**Methods/Interventions:** At a CLIA-certified molecular pathology laboratory of a single institution, 1195 CRCs from 1088 patients were sequenced using a multigene mutation panel designed to detect single-nucleotide variants and insertion/deletion mutations in known hotspots of 46 common known cancer-causing genes. Patients with known hereditary syndromes, microsatellite unstable CRCs, and <30% tumor on tissue specimen were excluded. DNA was sequenced using the AmpliSeq™ Cancer Panel on the Ion Torrent Personal Genome Machine for NGS (Life Technologies, Guilford, CT). Fisher's exact test tested the null hypothesis of no difference in the mutation frequencies of genes in young (N=414) vs. later (N=783) age-of-onset CRCs.

**Results/Outcome(s):** The median age at diagnosis was 55 years (interquartile range: 45-62), with a median of 43 vs. 60.5 years for the young vs. later groups respectively. Significantly higher proportions of the young age-of-onset CRCs occurred in the distal colon (44.2 vs. 35.2%) and rectum (34.1 vs. 28.2%; p=0.001) when compared to later age-of-onset CRCs. The majority of the tumors were regionally advanced (10%) or distantly metastatic (76%) and this distribution did not differ between groups. Overall, 1129 mutations were identified in 1197 tumors (94.3%), but no hotspot mutation was detected in 7.7 vs. 4.6% (p=0.035) of the young vs. later age-of-onset CRCs. Most frequently detected mutations (present in >5% of tumors tested) occurred in 7 genes: TP53 (763, 63.8%), KRAS (569, 47.5%), APC (466, 38.9%), PIK3CA (181,15.1%), SMAD4 (132,11%), BRAF (87,7.3%), and FBXW7 (82, 6.9%). When stratified by age, the same set of 7 genes harbored the most frequent mutations in both age groups (Figure). Mutation frequencies differed significantly for 5 (10.8%) genes: APC (33.3 vs. 41.9%, p=0.011), BRAF (5.1 vs. 8.4%; p=0.039) and RET (0 vs. 1.1%;p=0.032) mutations were less frequent for young-onset CRCs, but SMAD4 (13.7 vs. 9.6%; p=0.047), and RB1 (1.9 vs. 0.6%; p=0.029) mutations were more frequent.

**Conclusions/Discussion:** The somatic hotspot mutation profiles focusing on potentially actionable common cancer genes appear to be largely shared between CRCs occurring before age 50 and those diagnosed later, with 11% of the genes examined showing age-related differences in mutation frequency. More in-depth analysis focusing on the extreme age groups may further reveal distinct mutations and novel carcinogenesis pathways.





## COLORECTAL RESECTION FOR NEUROENDOCRINE MALIGNANCY IS ASSOCIATED WITH INCREASED TRANSFUSION RATES COMPARED TO RESECTION FOR OTHER MALIGNANT INDICATIONS.

P637

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**Purpose/Background:** Malignant neuroendocrine tumors of the colon and rectum are clinically and pathologically distinct from more commonly found adenocarcinomas. The aim of this study was to determine whether outcomes differ following colorectal resection for malignant neuroendocrine tumors when compared to other malignant indications for surgery.

**Methods/Interventions:** The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database was used to identify patients who underwent colorectal surgery from 2007-2012. ICD-9 diagnostic codes were used to classify patients by type of malignancy. Univariate and multivariate analyses were performed to compare outcomes.

**Results/Outcome(s):** Of 52 037 patients, 694(1.3%) underwent surgery for neuroendocrine malignancies of the colon and rectum. Average age and operative times were lower in the neuroendocrine group. Those with neuroendocrine tumors were less likely to receive radiation and have a history of stroke, congestive heart failure or chronic obstructive pulmonary disease; they were more likely to have a history of tobacco use, hypertension, and disseminated disease. On univariate analysis, patients with neuroendocrine malignancy had a decreased rate of deep venous thrombosis (DVT; 0.4% vs 1.5%,  $p=0.02$ ) and an increased rate of blood transfusions (10.7% vs 7.8%,  $p<0.01$ ) when compared to patients with other malignancies. On multivariate analysis, there was no difference in the incidence of DVTs between the two groups. However, the increased need for blood transfusion in the neuroendocrine group remained statistically significant

(Odds Ratio 2.76, 95% confidence interval [2.09-3.63],  $p<0.001$ ). While the risks of transfusion was greater, the length of stay was shorter in the neuroendocrine group (8 days vs 9 days;  $p=0.04$ ). There was no difference in mortality.

**Conclusions/Discussion:** Colorectal resection performed for neuroendocrine malignancies is associated with increased need for blood transfusions but a shorter length of stay compared to resection for other colorectal cancers. Knowledge of this will allow for improved preoperative education as well as changes in the perioperative management that might mitigate this difference.

## INITIATION OF A TRANSANAL TOTAL MESORECTAL EXCISION (TaTME) PROGRAM AT AN ACADEMIC TRAINING PROGRAM: OPTIMIZING PATIENT SAFETY AND QUALITY OUTCOMES.

P638

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**Purpose/Background:** Short term results have shown TaTME to be a safe and effective surgical approach for patients with cancers of the mid to low rectum. Considered technically challenging with a steep learning curve, adoption has been limited to a few academic centers across the United States.

**Methods/Interventions:** This is a single center retrospective review of consecutive patients who underwent TaTME from December 2014 to August 2016. Data were collected on demographics, indication for surgery, disease characteristics, operative details, length of stay, 30-day morbidity and mortality. Implementation of TaTME at our institution included didactic and cadaver based training for foundation skills, a team approach, and staged introduction of cases for malignancy and advanced complexity. All procedures were performed with an abdominal and perineal team working simultaneously, with a colorectal resident assisting the perineal surgeon. Statistical analyses were performed using STATA software (version 14; Stata Corp).

**Results/Outcome(s):** A total of 40 patients (24 male) underwent TaTME. The median age for the cohort was 55 (IQR 46.7,63.4) with a median BMI of 29 (IQR 24.6,32.4). The primary indication for surgery was cancer ( $n=30$ ) with the tumor height ranging from 0.5-15 cm from the anal verge. Twenty-four (80%) of the rectal cancer patients received preoperative chemoradiation. The most common procedure was low anterior resection (67.5%) followed by total proctocolectomy (15%) and abdominoperineal resection (12.5%). Ninety-five percent (38/40) of the abdominal field procedures were performed using a minimally invasive approach with only a single conversion. Median

operative time was 380 minutes (IQR, 306,454.4), with no change over the duration of the study. For patients with malignancy, the mesorectum was designated as complete or nearly complete in 100% of the specimens. A median of 14 (IQR 12,17) lymph nodes were harvested and 100% (30/30) of the rectal cancer specimens achieved R0 status. Median length of stay was 4.5 days (IQR 4,7). Four (10%) patients were readmitted within 30 days. There were no reported deaths. There were no intra-operative complications. Intra-operative and post-operative complications are shown in Table 1.

**Conclusions/Discussion:** A TaTME program can be safely implemented in a major academic medical center within the context of a colorectal residency training program. All programs should closely monitor outcomes for quality and patient safety. Long-term follow-up is needed to evaluate the impact of this approach on overall and cancer-specific survival.

**P638 Intra-operative and post-operative complications after TaTME**

Complication	Incidence
Perineal wound breakdown, % (n)	40 (2)
Leak, % (n)	2.5 (1)
Colovaginal fistula, % (n)	0
Anastomotic stricture, % (n)	0
Anastomotic sinus, % (n)	0
DVT, % (n)	2.5 (1)
PE, % (n)	0
Incisional hernia, % (n)	0
Wound dehiscence, % (n)	2.5 (1)
SSI, % (n)	
Superficial	5 (2)
Deep	0
Organ Space	5 (2)
Ileus, % (n)	7.9 (3)
Urinary retention, % (n)	7.9 (3)
Urinary tract infection, % (n)	5 (2)
Urethral injury, % (n)	0
Ureteral injury, % (n)	0
Renal Failure, % (n)	0
Pneumonia, % (n)	0
Return to OR, % (n)	0

**SPLenic FLEXURE MOBILIZATION FOR SIGMOID AND LOW ANTERIOR RESECTIONS (LAR) IN THE MIS ERA: HOW OFTEN AND AT WHAT COST?**

P639

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**Purpose/Background:** Splenic flexure mobilization (SFM) is necessary for many sigmoid and low anterior resections (LAR). It frees the bowel, permits a longer proximal margin and provides better vascularized bowel for anastomosis. As regards open surgery, in the majority of series SFM was carried out in 40-60% of patients; the associated anastomotic leak rates, not uncommonly, were 5-10%. The rate of splenic injury requiring splenectomy or splenorraphy in the open series was about 1 %. Open SFM requires a longer incision and can be challenging due to the spleens location. In contrast, minimally invasive (MIS) methods facilitate SFM because the camera and instruments are brought to the flexure which allows for take-down without applying traction. This study's purpose was to assess the use and consequences of SFM for sigmoidectomy and LAR done using MIS methods.

**Methods/Interventions:** A retrospective review of sigmoid and LARs over a 10 year period was carried out. Information regarding the indications, surgical method, SFM (when done), operative data, intraoperative and postoperative complications, and short term outcome was obtained from a prospective database as well as operative notes and hospital charts. The students T test and chi square, where appropriate, were used for data analysis.

**Results/Outcome(s):** A total of 671 patients (pts) underwent either MIS sigmoid resection (321, 47.8%) or LAR (350, 52.2%). The indications were: cancer (376, 56.0%), diverticular disease (223, 33.2%), and benign neoplasm/other (72,10.6%). The surgery was done laparoscopic-assisted (LA) in 402 (59.9%) and hand-assisted laparoscopic (HAL) in 269 pts(40.1%). Overall, SFM was carried out in 577 pts (85.9%)(LA 83.6, HAL 89.6%); lateral to medial approach was used in 77% and medial to lateral in 23%. Conversion from LA to HAL method was necessary in 4 (0.7%) while open conversion was required in 4 pts (0.7%). The splenectomy/splenorrhaphy rate was 0. Issues/complications related to SFM were noted in 26 pts (4.3%) The most common problem was bleeding (18 pts). The source was a splenic capsular tear in 11 pts and the mesentery/retroperitoneal/renal area in 7pts. Blood loss was judged less than 100 ml in 13 pts: losses between 150-600 ml were noted for 5 pts. Serosal bowel injuries were noted in 3 and an enterotomy in 1 pt(all repaired immediately). Pancreatic injury was suspected in 4 patients; 3 developed pancreatitis that resolved with medical treatment. The overall anastomotic leak/abscess rate was 3.1%; there was no difference between the SFM and non-SFM pts.

**Conclusions/Discussion:** SFM was carried out in 85.9% of sigmoid/LAR MIS pts and was associated with low complication and leak/abscess rates. The authors hypothesize that the low leak rate is attributable, in part, to the high SFM rate. MIS SFM is safe and is advised for all sigmoid/LAR pts except those with very lengthy sigmoid colons.

### PALLIATIVE AND END-OF-LIFE CARE TRAINING IN COLON AND RECTAL SURGERY FELLOWSHIPS: A SURVEY OF THE FELLOWS.

P640

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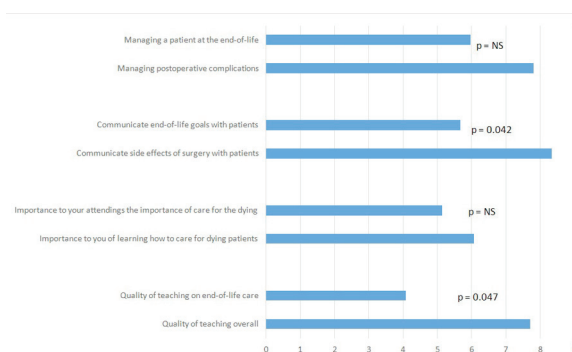
**Purpose/Background:** Surgery with palliative intent accounts for 10 to 20% of all operative interventions, and the most common indication is colorectal cancer. While colorectal surgery fellowship training provides exposure to surgical modalities for palliation, the Accreditation Council for Graduate Medical Education and the American Board of Colon and Rectal Surgery Milestones fail to provide a framework for developing skills to address the needs of patients at the end of life. As a result, it is unknown whether fellows are receiving training in palliative care and whether they are able to demonstrate the ability to care for such patients. We sought to examine palliative and end-of-life care education among colorectal surgery fellows and its relationship with experience and the quality of overall training.

**Methods/Interventions:** Using a modified survey developed and validated by the Canadian Researchers at the End of Life Network, we recruited all fellows attending the Colorectal Residents Annual Career Course in November 2016 to participate. The survey domains include attitudes, knowledge, and competency related to end-of-life care in addition to demographic information, information about palliative and end-of-life care training during residency and fellowship, and perceived barriers to palliative and end-of-life care.

**Results/Outcome(s):** Of the 43.5% respondents, 52% reported that learning how to care for dying patients was 'very important' or 'most important.' On a scale of 1-10, the fellows rated the overall quality of training as 'very good' or 'excellent' (weighted average (WA) = 7.7) compared with 'below average' to 'average' (WA = 4.07) for quality of teaching on end-of-life care ( $p = 0.047$ ). Fellows reported that their training in communication about side effects of surgery is 'very good' or 'excellent' (WA = 8.33) compared with 'average' (WA = 5.67) for training in communication about end-of-life goals ( $p = 0.042$ ). Of the respondents, 25.9% report being explicitly taught to discuss introducing palliative care or to determine when to refer patients to

hospice during their fellowship. Far fewer fellows report being taught how to tell a patient when he or she was dying (14.8%) or how to help patients, their families, and friends with reconciliation (7.4%). Further, only 14.8% of fellows have been taught to manage their own stress related to caring for terminally-ill patients and their families.

**Conclusions/Discussion:** Colorectal fellows value palliative and end-of-life care. However, they rate the quality of end-of-life care training poorer than the overall quality of their training. This highlights a deficiency in the education of colorectal trainees who will care for an increasingly aged population at the highest risk of developing colorectal cancer. Structured incorporation of palliative and end-of-life care education into colorectal surgery fellowship may improve training and ultimately patient care.



### THE FEASIBILITY OF SURGICAL DEBULKING OF COLORECTAL TUMORS IN AN ORTHOTOPIC METASTATIC COLON CANCER MOUSE MODEL.

P641

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**Purpose/Background:** Colorectal cancer (CRC) is a leading cause of cancer-related deaths in the US. Metastatic disease portends a poor prognosis. Previous work in our lab found the intra-rectal injection mouse model to be a safe, reproducible and successful orthotopic, metastatic CRC model, emulating the pattern of primary and metastatic tumor growth in humans. Due to large primary tumor burden causing increased morbidity and mortality, the study of metastatic disease has been hindered. This study aims to evaluate the feasibility of surgical debulking of primary tumor in mice to humanely allow the continuation of CRC metastatic disease for further studies.

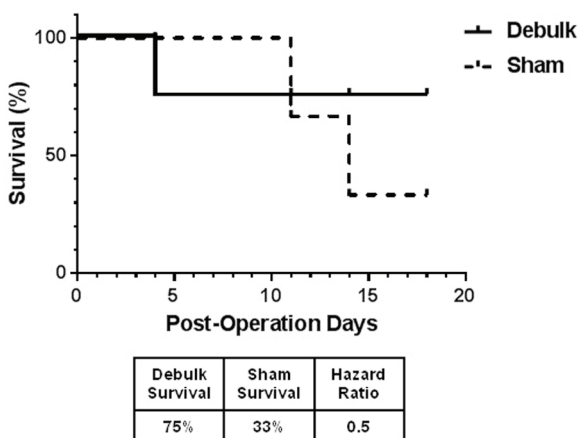
**Methods/Interventions:** This protocol is approved by the Institutional Animal Care and Use Committee (IACUC) of the Ochsner Clinic Foundation. Luciferase-tagged HT-29 colon cancer cells are injected into the rectal submucosa of seven NOD/SCID mice. Primary tumor growth is monitored weekly via bioluminescence

imaging (BLI) using the Xenogen IVIS system and Living Image software for four weeks. The mice are randomized into two groups; surgical debulking (4) and sham surgery (3). For both surgeries mice are placed supine to allow access to the perineal region. A 5mm incision is made lateral to the anus and carried down until tumor is visualized avoiding injury to the rectum and adjacent structures. For the debulking group the tumor is mobilized free from surrounding tissue and the bulk of the tumor is sharply removed from the rectum. In the event of rectal injury primary repair is performed with non-absorbable suture. For sham surgery group the tumor is mobilized without removal. Post operatively the mice are maintained on a liquid diet for one week prior to resuming a solid diet. Mouse well-being is monitored as is progression of tumor and metastases with weekly BLI evaluation.

**Results/Outcome(s):** The mice were followed for 18 days post operation. Comparison of tumor BLI of debulking and sham groups on post operative day four demonstrated a 55% decrease in the debulking group, and a 55% increase in the sham surgery group. One mouse from the debulking group died from bowel obstruction on post operation day 4. Two mice from the sham surgery group died from tumor burden 10 days post operation. Of the surviving mice, 66% of the debulking mice were observed to develop distant organ metastases. The overall survival of the debulking group mice was 75% compared to 33% for the sham surgery mice with a hazard ratio of 0.5 (Figure 1).

**Conclusions/Discussion:** This experiment demonstrates that debulking surgery for mice is feasible. Surgical debulking reduces primary tumor burden and allows longer survival enabling the development of distant organ metastasis. This establishes a model that may be used for future studies of metastasis treatment. Future plans include repeat debulking using a larger number of mice, and implementation of cecostomy creation for bowel diversion in obstructed mice.

Survival curve of mice at 18 days post operation



**IS AGE JUST A NUMBER? INFLUENCE OF AGE ON OUTCOMES FOLLOWING SEGMENTAL RESECTION FOR COLORECTAL CANCER.**

P642

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**Purpose/Background:** Advanced age is a risk factor for development of colon and rectal cancer; however, data on outcomes in elderly patients following definitive treatment are lacking. The aim of this study is to evaluate the impact of advancing age on outcomes following segmental resection for colorectal cancer (CRC).

**Methods/Interventions:** This is a single center retrospective review of consecutive patients from 2007 to 2012 aged 50 years or older who underwent segmental resection for CRC. Data were collected regarding demographics, operative approach, 30 day mortality, and 30 day morbidity. Age was stratified by decade. Statistical analyses were performed with STATA14 (StataCorp, College Station, TX).

**Results/Outcome(s):** There were 352 patients who met criteria of which 178 (50.6%) were male. The median age was 67 (IQR 59-78) and the median body mass index was 27 (IQR 24-31). There were 152 laparoscopic resections (43.2%) with the most common procedures being right colectomy (35.5%) and low anterior resection (22.2%). The most common post-operative complication was ileus (21.3%). There were 56 patients (16%) readmitted within 30 days of surgery. Advanced age was associated with 30 day readmission (CI 1.0 -1.9, p=0.04) while COPD was associated with any 30 day morbidity (CI 1.2-6.9, p=0.018). When complications were analyzed using univariate analysis by decade, increasing age was associated with increased urinary tract infections, venous thromboembolism, pneumonia, cardiac complications as well as readmission. Multivariate modeling, however, showed age only to be associated with cardiac complications (CI 1-2.5, p=0.05) and readmission (CI 1-2.1, p=0.04).

**Conclusions/Discussion:** Our data suggest that resection for CRC in older patients is safe, and that advanced age appears to be a risk factor only for post-operative cardiac complications and readmission. Targeted patient-and disease-specific interventions in the elderly population may mitigate these complications and improve the quality of care.

	Cohort N=352	By Decade				p
		50-59 N=95	60-69 N=98	70-79 N=83	80+ N=76	
30 day Death, n (%)	7 (2)	0	3	2	2	0.43
30 day morbidity, n (%)	146 (41)	36	36	39	35	0.38
Urinary Tract Infection, n (%)	26 (7.4)	3	6	6	11	0.04
VTE, n (%)	9 (2.6)	1	3	0	5	0.04
Ileus, n (%)	75 (21.3)	23	20	20	12	0.51
Bleeding, n (%)	11 (3.1)	3	2	2	4	0.84
Leak, n (%)	3 (0.85)	1	1	1	0	0.84
Surgical Infections						
Superficial, n (%)	29 (8.3)	13	9	4	3	0.07
Deep/Organ Space, n (%)	7 (2)	2	4	0	1	0.25
Clostridium Difficile, n (%)	5 (1.4)	0	1	2	2	0.41
Pneumonia, n (%)	17 (4.8)	2	3	3	9	0.01
Reoperation, n (%)	4 (1.1)	0	2	2	0	0.28
Cardiac, n (%)	36 (10.3)	4	3	12	17	<0.001
Readmission, n (%)	56 (16)	10	10	20	16	0.02

## FRAGMENTED PATTERN OF TUMOR REGRESSION AFTER LONG-COURSE NEOADJUVANT CHEMORADIOTHERAPY AND RADICAL SURGERY FOR LOCALLY ADVANCED RECTAL CANCER.

P643

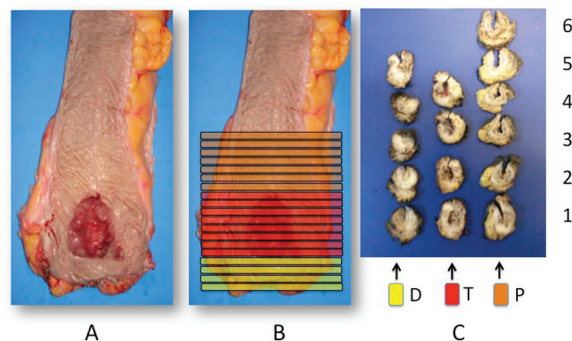
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**Purpose/Background:** Tumor scatter after neoadjuvant chemoradiotherapy (nCRT) was reported in a high proportion of patients. However, there is variability between different authors regarding the distance of the separate tumor foci from the main residual disease, and this could be important when considering a local excision after nCRT. The aim of this study was to investigate the distance between viable tumor cells and the macroscopic tumor edges after nCRT and radical surgery.

**Methods/Interventions:** After Institutional Review Board approval, patients who underwent radical surgery after nCRT were studied prospectively. All patients had the same criteria for nCRT and the same treatment modality. Two dedicated pathologist studied the specimens in a particular way designed to our purpose. Transversal sections of the rectum every 4 millimeters were performed, 3 cm proximal and 3 cm distal to the edge of the macroscopic ulcer, in addition to the standard technique in order to identify tumor cells outside the gross ulcer. Complete clinical responders were excluded.

**Results/Outcome(s):** From August 2015 until August 2016, 18 consecutive patients were included. Mean age was 61 years (SD± 12.4) and 39% (95%CI: 33-51%) were females. Mean distance of tumor from the anal verge was 5.8 cm (SD ±2.7). Surgery was performed at mean of 12 weeks (SD± 4.2) after radiotherapy completion. Fourteen patients (78%) had tumor cells foci outside of the gross ulcer. Of these, 9 patients (64%) had only one separate cluster of cells and 5 patients (36%) had more than one. The mean distance from the edge of the gross ulcer to the separate cell nest was 5.6 mm (range: 2-12 mm, SD± 3.5). In two cases (11%) separate tumor foci were at 12 mm from the main lesion.

**Conclusions/Discussion:** Tumor fragmentation is expected to be present in a high proportion of patients after nCRT. Despite the majority of them will present separate tumor nest at less than 10 mm from the main lesion, it should be considered that around 10% of patients could have separate tumor foci at more distance so the resection margin should be wider in order to reduce local recurrence.



A. Macroscopic view of the tumor after neoadjuvant therapy. B. Each colour bar shows each slide and its relation with the tumor. C. Yellow bars (D) refer to slides distal to the tumor; Red bars (T) refer to slides in contact with the tumor; Orange bars (P) refer to slides proximal to the tumor.

## ONCOLOGIC OUTCOMES OF SINGLE-INCISION LAPAROSCOPIC SURGERY FOR RIGHT COLON CANCER: A PROPENSITY SCORE-MATCHING ANALYSIS.

P645

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**Purpose/Background:** The aim of this study was to investigate oncologic, perioperative, and pathologic outcomes of single-incision laparoscopic right hemicolectomy (SILRC) compared to conventional laparoscopic right hemicolectomy (CLRC) for right colon cancer using propensity score-matching analysis.

**Methods/Interventions:** From November 2009 through September 2014, 260 patients underwent laparoscopic surgery for right colon cancer. Data on short-term and long-term outcomes were collected prospectively and reviewed. Propensity score-matching was applied at a ratio of 1:2 to compare the SILRC (n=40) and the CLRC (n=80) groups.

**Results/Outcome(s):** Operation time, estimated blood loss, time to diet were not different; however, the SILRC group showed less pain on operative day and postoperative day #2 (4.8 vs. 5.9,  $p<0.001$  and 3.6 vs. 4.6,  $p=0.006$ , respectively) as well as shorter incision lengths (4.0 vs. 7.3 cm,  $p<0.001$ ). Morbidity, mortality, and pathologic outcomes were similar between groups. The 3-year overall survival rates were 96.0% vs. 97.5% ( $p=0.740$ ), and disease-free survival rates were 93.5% vs. 97.5% ( $p=0.444$ ) in the SILRC and the CLRC groups, respectively.

**Conclusions/Discussion:** The long-term oncologic outcomes as well as short-term outcomes of SILRC were comparable to CLRC. It appears to be a safe and feasible option with better cosmetic results.

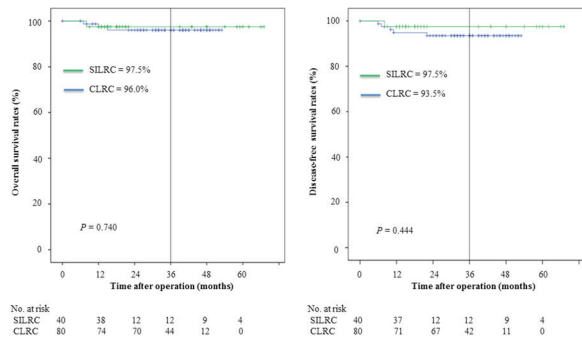


Figure 1. 3-year overall and disease-free survival of the SILRC and CLRC groups

### IMPLEMENTATION OF AN ENHANCED RECOVERY PROTOCOL IN A LATIN AMERICA CANCER HOSPITAL: DIFFICULTIES DURING THE EARLY STAGE.

P646

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**Purpose/Background:** Background: despite the strong evidences pointing to clear improvements in postoperative outcomes after the adoption of enhanced recovery protocols (ERP), their introduction in daily clinical practice uses to meet some obstacles. The aim of this study is to report the main difficulties in the early stage of an enhanced recovery protocol (ERP) at a single Brazilian cancer hospital.

**Methods/Interventions:** Methods: since March, 2016, we started an enhanced recovery protocol (ERP) based on ERAS guidelines. Our ERP consists of 12 perioperative care items. We considered as full adherent to protocol when a case had at least 10 items correctly applied. Elective surgeries for colorectal cancer have been consecutively included. Pelvic exenterations, cytoreductive surgery with HIPEC, and emergency surgeries are excluded from the ERP. Data have been collected in a prospective database. The institution receives patients from private and public health insurance, and has formal training surgical programs. This is a descriptive report from the initial four months of implementation.

**Results/Outcome(s):** Results: 132 patients (60 female / 72 male) were included in this analysis. 80 patients had colon tumors, and 52 had rectal cancer. Minimally invasive surgery (laparoscopic or robotic) were performed in 80 (60.6%) patients. Full adhesion was achieved in only 49% of cases in these first four months of implementation. Antibiotic and antithrombotic profilaxis were correctly applied in 100% of patients. Avoiding drains, avoiding the use of opioids, and restrictive fluid therapy were the items with worst adhesion rate (15.2%, 45.4%, and 61.4% respectively). The median length of hospital stay was 6 days (range from 3 to 61 days). Major complication

rate (Clavien-Dindo III and IV) were 19%, and 60-days mortality rate was 1.5% (2 cases). Anastomotic leak occurred in 9 patients (6.8%). Readmission rate was 12.3%.

**Conclusions/Discussion:** Conclusions: our adhesion rate was lower than expected during our early stage of implementation, not yet translating in the expected improvement of postoperative outcomes. We identified the use of drains, use of opioids, and inadequate fluid therapy as the items that need more attention and education of the team.

### THE USE OF LAPAROSCOPY FOR LOCALLY ADVANCED (T4) COLON ADENOCARCINOMAS.

P647

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**Purpose/Background:** Laparoscopic surgery is a well-established approach for resecting colon adenocarcinoma with many proven benefits. This approach however remains controversial when resecting locally advanced disease due to concern for an inadequate oncologic resection. The current recommendation is to perform an open resection for these lesions. This study aims to evaluate the oncologic safety of laparoscopic surgery in T4a and T4b colon adenocarcinoma.

**Methods/Interventions:** The US National Cancer Data Base (2010-2012) was reviewed for patients with stage T4 adenocarcinoma of the colon, and stratified by surgical approach. Correlations were analyzed with student t-tests and chi-square tests. Propensity score matching was used to create comparable laparoscopic and open groups, and Kaplan-Meier and Weibull survival analyses were then performed.

**Results/Outcome(s):** A total of 9,001 patients were identified with 5,715 T4a lesions and 3,286 T4b lesions. For T4a lesions, 28.2% were laparoscopic, with a 19.9% conversion rate, and 65.9% were open. For T4b lesions, 24.7% were laparoscopic, with a 54.4% conversion rate, and 74.1% were open. After matching, the laparoscopic approach was associated with improved 5 year survival for all T and N stages except for T4bN2 (T4aN0 69.6% vs 34.7% p<0.0001, T4aN1 53% vs 41.3% p<0.0012, T4aN2 39.1% vs 31.5% p<0.0037, T4bN0 70.6% vs 42.7% p=0.0187, T4bN1 54.7% vs 24.9% p=0.0377, T4bN2 39.8% vs 41.4% p=0.995). On multivariate analysis, a greater hazard of mortality was associated with higher Charlson Comorbidity score (score 1 HR 1.17, p=0.013, score 2 HR 1.72, p<0.0001), T4b lesion (HR 1.15, p=0.022) and higher N stage (N1 HR 1.67, p<0.0001, N2 HR 2.31, p<0.0001). Improved survival was associated with a laparoscopic approach (HR 0.69, p<0.0001) and adjuvant therapy (HR 0.41, p<0.0001).

**Conclusions/Discussion:** This study shows that for both T4a and T4b colon adenocarcinoma, laparoscopy does not compromise survival. As expected, survival was positively associated with adjuvant therapy and negatively associated with higher comorbidity score and more advanced staging. For locally advanced lesions, laparoscopic surgery was associated with improved survival for all stages except for T4bN2. It is possible that laparoscopy was selected for less aggressive and more easily resected lesions; a characteristic that is not differentiated by the T stage classification. This may introduce selection bias into the data and contribute to the improved survival in this group. Future studies are needed to identify a subset of these lesions for which a laparoscopic oncologic resection would be most beneficial.

#### PREOPERATIVE ASSESSMENT OF CIRCUMFERENTIAL RESECTION MARGIN INVOLVEMENT IN RECTAL CANCER USING MAGNETIC RESONANCE IMAGING: CAN PERINODAL EXTENSION BE DEFINED AS CIRCUMFERENTIAL RESECTION MARGIN INVOLVEMENT IN RECTAL CANCER?

P648

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**Purpose/Background:** Preoperative assessment of CRM can influence the direction of treatment in rectal cancer whether preoperative chemoradiation treatment will be performed first or not. MRI prediction of CRM has some limitations when mesorectal tumor deposits or enlarged lymph nodes are present. The aim of this study is to investigate the correlation between CRM involvement in preoperative MRI and pathologic CRM after radical surgery.

**Methods/Interventions:** A total of 127 patients with rectal cancer who underwent curative resection between January 2011 and January 2015 were included for the analysis. All the patients were diagnosed more than T3 clinically in preoperative MRI and didn't undergo preoperative chemoradiation treatment. In the preoperative evaluation, CRM involvement in MRI was classified into direct tumor spread and perinodal extension. Direct tumor spread was defined as tumors extend beyond the muscularis propria and perinodal extension was when mesorectal or lymph nodes deposits were present. The correlation between CRM involvement in preoperative MRI and pathologic CRM after surgery was compared in each category of CRM using McNemer's test.

**Results/Outcome(s):** When pathologic CRM was defined less than or equal to 2mm, preoperative assessment of CRM with direct tumor spread was matched pathologic CRM. It showed sensitivity with 18.2%, specificity with 89.5% and accuracy with 77.2% (P=0.265).

However, CRM with perinodal extension in preoperative MRI didn't match pathologic CRM. It's sensitivity was 18.2%, specificity 95.2% and accuracy 81.9% (P=0.011). When pathologic CRM was defined less than 2mm, CRM with direct tumor spread and perinodal extension in MRI were matched pathologic CRM after surgery (P>0.999, P=0.332).

**Conclusions/Discussion:** Preoperative assessment of CRM involvement in rectal cancer is very important because it may guide further treatment. In this study, We showed preoperative assessment of CRM involvement using MRI has higher false positive rates and CRM involvement with perinodal extension should be considered more carefully. Further investigation is needed to understand the correlation between preoperative CRM involvement using MRI and pathologic CRM after surgery.

#### CECAL CANCER IS DIFFERENT FROM ASCENDING COLON CANCER IN CLINICAL PRESENTATIONS AND PROGNOSIS.

P649

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**Purpose/Background:** Proximal colon cancers have different clinical presentation from distal colon cancers and more likely present with advanced stage. Many studies define proximal colon cancer as tumor located in cecum to proximal transverse colon. This ambiguity in the anatomical definition may create confusion in communication to other medical staffs as well as patients. Defining cecum as a pouch-like structure adjacent to ileocecal valve, cecal cancer may mimic the clinical presentation of appendicitis when the appendiceal orifice is obstructed. This study investigates the difference and similarity in clinical presentation and prognosis between cancers in cecum and ascending colon.

**Methods/Interventions:** Retrospective analysis was performed in the patients who were diagnosed with cecal or ascending colon cancer and received operative management at St. Vincent's Hospital, The Catholic University of Korea, from January 2009 to December 2013. Clinical presentation, histological finding, recurrence rate, and survival period were analyzed.

**Results/Outcome(s):** A total of 147 patients were included in this study. Of them, 46 (31%) patients were diagnosed with cecal cancer, and 101(69%) patients were with ascending colon cancer. Mean age was 62.07±2.4SD and 65.09±1.1SD, and male: female sex ratio was 17:29(37%:63%) and 44:57(43.6%:56.4%) in the cecal cancer group and the ascending colon cancer group, respectively. No significant difference was found in age, sex and other patient characteristics. However, the rate of colonic perforation (13.3% vs 3.0%, p-value=0.026), rate of emergency surgery (20.0% vs 6.0%, p-value=0.014), rate of

open laparotomy (54.3% vs 72.3%, p-value=0.042) were significantly higher in the cecal cancer group than in the ascending colon group. Also, the cecal cancers were more likely to present with advanced stage (TNM stage III/IV, 60.9% vs 38.6%, p-value=0.010). The median follow-up period was 58.3±6.3 and 75.1±2.4 months. The cancer recurrence was observed in 12 (26.1%) patients of the cecal cancer and 19 (18.8%) of the ascending colon cancer. There was no significant difference in DFS (61.5±6.3 vs 69.4±3.6, p-value=0.189) in two groups. The overall survival (58.3±6.3 vs 75.1±2.4, p-value=0.008) was significantly higher in the ascending colon cancer group than in the cecal cancer group.

**Conclusions/Discussion:** The patients diagnosed with cecal cancer exhibited higher rate of colonic perforation, emergency surgery than the patients with the ascending colon cancers did. Moreover, the patients with cecal cancer are likely to be diagnosed with advanced stage.

Table 1. Patient characteristics for cecal cancer versus ascending colon cancer

Characteristic	Cecal cancer (N=46)	Ascending colon cancer(N=101)	P
Median age	62.07±2.45D	62.07±2.45D	
Sex			0.284
male	17(37.0%)	44(43.6%)	
female	29(63.0%)	57(56.4%)	
Type of operative approach			0.042
open	21(45.7%)	26(25.7%)	
laparoscopy	25(54.3%)	73(72.3%)	
conversion	0(0%)	2(2.0%)	
Combined colonic perforation			0.026
Yes	6(13.3%)	3(3.0%)	
No	40(86.7%)	98(97.0%)	
Combined colonic obstruction			0.482
Yes	8(17.8%)	16(16.0%)	
No	38(82.2%)	85(83.2%)	
Emergency surgery			0.014
Yes	9(20.0%)	6(6.0%)	
No	37(80.0%)	95(94.0%)	
Type of surgery			0.168
Ileo-cecectomy	3(6.5%)	1(1.0%)	
Right hemicolectomy	41(89.1%)	90(89.1%)	
Extended-right hemicolectomy	2(4.3%)	8(7.9%)	
bypass	0(0.0%)	2(2.0%)	
Stage at presentation			0.010
Stage I/II	18 (39.1%)	62 (61.4%)	
Stage III/IV	28 (60.9%)	39 (38.6%)	

**PORT SITE METASTASES FOLLOWING LAPAROSCOPIC COLECTOMY FOR COLORECTAL CANCER.**

P650

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**Purpose/Background:** Laparoscopic colectomy has been increasingly utilized for resection of primary colorectal cancer due to equivalence of R0 resection, decreased post-operative pain and shorter length of stay compared to

open colectomy. There are few studies examining the risk of peritoneal metastases from laparoscopy.

**Methods/Interventions:** This was a single institution, retrospective study from prospective data that identified patients undergoing cytoreductive surgery and HIPEC for metastatic colorectal cancer. These patients previously had laparoscopic colectomy to remove their primary tumor. Patient characteristics, histology, pathology, prior treatments, and outcomes were reviewed.

**Results/Outcome(s):** Thirteen patients who had prior laparoscopic colectomy to remove their primary tumor and who subsequently underwent cytoreductive surgery and HIPEC were identified. There were four females and nine males, with median age of fifty. Tumors were mainly staged at T3 and T4 at the time of laparoscopic surgery. Twelve of these patients were found to have metastatic deposits at a prior laparoscopic port site. Median time between laparoscopic resection and diagnosis of port site metastasis was twenty months.

**Conclusions/Discussion:** Patients who have undergone laparoscopic colectomy for colorectal cancer may be at increased risk for peritoneal metastases at port sites. Our study is limited by small patient population, retrospective nature, and selection bias due to patients being treated at a tertiary referral center. This study illustrates that the risk of intra-abdominal metastasis, especially at port sites, after laparoscopic colectomy is an important consideration that requires further study. Higher T stage may place patients at risk of peritoneal metastases following surgery, therefore, primary resection by open technique should be considered to decrease the risk of peritoneal metastases.

**IS THERE A DIFFERENCE IN SURGICAL AND ONCOLOGICAL OUTCOMES COMPARING RIGHT WITH LEFT LAPAROSCOPIC COLECTOMY FOR COLON CANCER?**

P651

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**Purpose/Background:** Laparoscopic colorectal surgery reduced morbidity of colorectal resections. Right and left colectomy are the most frequent procedures for colon cancer, however the comparison between these procedures are scarce in the literature so far. Objective: to compare postoperative morbidity and oncologic specimen dissection quality of laparoscopic right versus left colectomy.

**Methods/Interventions:** Methods: A retrospective analysis from a prospectively maintained database of 332 patients operated at a University Hospital between 2006 and 2016. Postoperative 30 days complications were classified by Clavien-Dindo scale and major complication was defined as ≥ 3. Oncologic resection quality was evaluated



by the mean number of lymph nodes retrieved and surgical margins. Data was analyzed with SPSS<sup>®</sup> 20.0.

**Results/Outcome(s):** Colectomy was performed in 332 patients, been 98 (29.5%) right colectomies and 234 (70.5%) left colectomies. Mean age at surgery was  $62.8 \pm 11.9$  years-old. Study population was comparable regarding age, comorbidities, body mass index and American Anesthesiologists Classification score. Preoperative hemoglobin level was also comparable (mean of 11.89 for right colectomy vs. 12.56 for left colectomy,  $p=0.27$ ). However, preoperative transfusion was more frequently related to right colectomies (5.1% vs. 0.4%,  $p=0.004$ ). Overall complications were low and 233 patients (70.2%) had uneventful recovery. Clavien-Dindo I complications occurred in 36 patients (10.8%), II in 26 patients (7.8%), IIIA in 2 patients (0.6%), IIIB in 13 patients (3.9%), IVA in 11 patients (3.3%), IVB in 5 patients (1.5%) and V in 6 patients (1.8%). Laparoscopic conversion rate was 7.8%, intraoperative complications occurred in 4.8% and reoperation was performed in 23 patients (6.9%). Comparison between right and left colectomies did not have statistically significant data for operative time, conversion, reoperation, postoperative severe complications and postoperative hospital stay. Anastomotic leak incidence was higher for left colectomies (9.4% vs. 2%,  $p=0.02$ ). Oncologic results were comparable for right and left colectomies with a mean of 19.5 lymph nodes retrieved for right colectomies and 19.5 for left colectomies. Free resection margins were obtained in 100% of right colectomies and 99.1% of left colectomies.

**Conclusions/Discussion:** Surgical outcomes and oncologic specimen quality were comparable for right and left laparoscopic colectomies. Higher anastomotic leak rates associated to left colectomies did not impair postoperative outcomes. Laparoscopic approach is a useful tool for colectomy in oncologic patients.

## THE ROLE OF VITAMIN D RECEPTOR IN METASTATIC COLORECTAL CANCER.

P652

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**Purpose/Background:** Despite optimal treatment with surgery and chemotherapy, the recurrence rates in colorectal cancer (CRC) persist, in part due to the presence of tumor-initiating cells (TIC) or cancer stem cells. Thus, therapeutic strategies with additional targeting of TICs may offer a great opportunity to treat metastatic CRC. This lab has previously developed lymph node stromal "HK" cells, which promote CRC growth and the development of distant organ metastases. Our published data investigated the effect of chemotherapy treatment on CRC, and found the population of CRC-TIC (Co-TIC),

identified as cells bearing CD133/CXCR4, to be enriched after treatment, resulting in a chemo-resistant cancer and CRC progression in our orthotopic metastatic CRC mouse model. The HK cells were found to be supportive of this development. It is reported that administered vitamin D synergizes with chemotherapeutic drugs in the treatment of CRC. However, the protective role and mechanism of vitamin D in metastatic CRC are largely unknown. Here, we investigate the expression of the vitamin D receptor in CRC, the effect on Co-TIC, and the role in CRC progression in vitro and in vivo.

**Methods/Interventions:** The expression levels of VDR in six CRC cell lines were examined by staining with FITC-conjugated anti-VDR antibody and detected by flow cytometry. The Co-TIC were defined by four-color staining of CD326, CXCR4, and CD133 in addition to VDR. For in vitro assay, six CRC cell lines were cultured in the presence of HK cell-conditioned media and then treated with 5-fluorouracil (5FU) and then examined for CD133/CXCR4 expression. For in vivo assay, luciferase-tagged CRC cell lines were injected intra-rectally into NOD/SCID mice. After 4 weeks, mice will receive either calcitriol (vitamin D3), 5FU or both. Tumor growth and metastasis are measured weekly by bioluminescent imaging (BLI). At the endpoint, the primary tumors will be examined and liver and lung metastases will be evaluated via BLI, H&E, and IHC staining.

**Results/Outcome(s):** VDR expression varies among colon cancer cell lines, ranging from 54.34% to 98.67% (Figure 1). The VDR expression will be examined by gating the Co-TIC populations (CD326+CXCR4+CD133+). By choosing variable-VDR expressing CRC lines, the in vivo experiment will examine the effect of VDR expression on response to treatment of metastatic CRC with calcitriol and 5FU.

**Conclusions/Discussion:** Our data suggest that Co-TIC play a key role in CRC development in vivo. Our orthotopic CRC model for metastatic CRC provides a platform to investigate variable VDR expression in CRC cell lines, followed by treatment with 5FU and calcitriol and determine whether level of VDR expression predicts response to combined treatment of metastatic CRC.

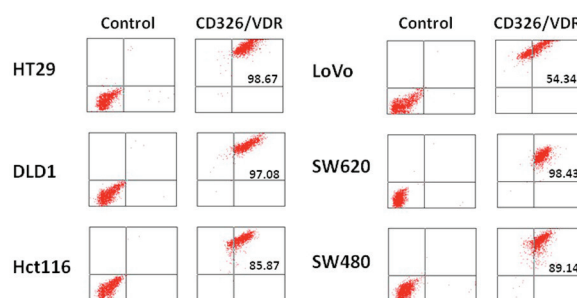


Figure 1. Expression of VDR in CD326 positive colon cancer cell lines.

### NERVE GROWTH FACTOR RECEPTOR (NGFR) AS A POTENTIAL NOVEL INDICATOR FOR METASTASIS AND RECURRENCE IN HUMAN COLORECTAL CANCER.

P653

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**Purpose/Background:** Nerve growth factor receptor (NGFR), a member of the Tumor Necrosis Factor Receptor superfamily, is a transmembrane glycoprotein that was originally shown to negatively regulate neuronal cell growth and proliferation. More recently NGFR expression has been described in various normal tissues as well as neuronal and non-neuronal cancers. In cancer, NGFR has been shown to portray dual functions as an oncogene in some malignancies and as a tumor suppressor in others. There is little and inconsistent data available describing a relationship between NGFR and colorectal cancer (CRC). We aim to elucidate this relationship and suggest NGFR as a potential indicator of prognosis and advanced disease.

**Methods/Interventions:** Formalin fixed paraffin embedded patient CRC samples were supplied by the Department of Colon and Rectal Surgery. First, primary CRC samples were matched to normal colon controls and stained for NGFR using immunohistochemistry (IHC). Staining positivity was quantified using a 0-4 intensity rating. Further NGFR staining was conducted on tissue microarrays of 33 pairs of primary and metastatic CRC tumors, and 20 matched pairs of primary tumors from patients that recurred and those with no sign of recurrence. Samples were matched by age, gender, tumor location, and degree of differentiation. Image-Pro software was used to digitally quantify stained slides and the absolute percent staining and the fold difference in staining of individual pairs were determined between groups.

**Results/Outcome(s):** NGFR protein expression levels were significantly higher in human CRC samples compared to normal colon controls by intensity rating ( $p < 0.001$ ,  $n = 13$ ). Metastatic tumors showed a significantly higher fold increase of NGFR expression as compared to matched primary tumors using digital imaging analysis of IHC staining ( $p = 0.012$ ,  $n = 33$ ). Likewise, primary tumors from patients that eventually recurred had a significantly higher fold increase in comparison to their matched non-recurred patient tumors ( $p = 0.002$ ,  $n = 20$ ).

**Conclusions/Discussion:** Previously, NGFR has been shown to possess both oncogenic and tumor suppressive functions but little has been described concerning its specific role in CRC progression. Here we show that NGFR protein expression levels by IHC were significantly higher in CRC tumor versus normal colon controls, higher in metastatic lesions versus matched primary tumors, and most importantly, positively correlates with tumor recurrence. This suggests that NGFR exhibits oncogenic

properties in CRC and may act as a novel prognostic indicator for advanced disease. Future experiments involving in vitro NGFR knock-down and overexpression, and utilization of our previously established orthotopic CRC murine model may further help to clarify the role of NGFR and assess its possibility as a targetable therapeutic marker.

### BODY WEIGHT CHANGE DURING CURATIVE OPERATION AND ADJUVANT CHEMOTHERAPY IN COLORECTAL CANCER.

P654

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**Purpose/Background:** In colorectal cancer (CRC), obesity is interesting because it might be related with oncologic outcomes. However, there was little evidence for clinical significance of body weight (BW) change during curative operation and adjuvant chemotherapy for CRC patients. This study was designed to assess the pattern of BW change before and after curative operation and during adjuvant chemotherapy (CTx) in CRC patients, and to find out its clinical significance.

**Methods/Interventions:** By the prospectively collected CRC database, 196 cases were enrolled between November 2008 and February 2016. They were performed the curative operation for CRC, and finished 12 cycles of chemotherapy with FOLFOX regimen. Patients with radiotherapy, emergency operation, or postoperative complications were excluded.

**Results/Outcome(s):** Total 196 cases included 111 males and 85 females, and their mean age was 58.4 years old. BW decreased 4.7 % after curative operation and increased 1.6 % after 12 cycles of CTx. During CTx, the pattern of BW recovery was similar in subgroup analysis by sex (male vs. female), primary tumor location (colon vs. rectum) and TNM stage (stage II vs. III vs. IV). Lower BMI group ( $< 18.5 \text{ kg/m}^2$ ) had faster recovery to preoperative BW and more increase of 6.2 % after CTx than normal or higher BMI group ( $P = 0.002$ ). After 12<sup>th</sup> CTx was finished, BW was increased in 116 cases (55.2 %), which included 69 with BW increase within 5% and 47 with BW increase over 5%. In the group with BW decrease over 5%, the incidence of often neutropenia (over 6 times) was higher than those in other group (27.3 % vs. 13.2 %,  $P = 0.042$ ).

**Conclusions/Discussion:** The pattern of BW change was a decrease of 4.7 % after curative operation and a recovery after 12<sup>th</sup> adjuvant CTx. In lower BMI group, BW recovery was faster. And, BW loss over 5 % after CTx was shown to have a tendency of more common neutropenia.

## THE ROLE OF MICRO RNA AND LYMPH NODE STROMAL CELL DERIVED EXTRACELLULAR VESICLES IN COLORECTAL CANCER METASTASIS.

P655

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**Purpose/Background:** Colorectal cancer (CRC) is the third most common malignancy worldwide with outcomes dependent on depth of tumor invasion, lymph node (LN) involvement, and the presence of extra-nodal metastasis. Our previous studies suggest that metastasis is associated with the interaction of cancer cells and the LN stromal microenvironment via extracellular vesicle (EV) mediated communication. Amongst the cargo of these EVs are micro RNAs (miRNAs), small non-coding RNAs that can target mRNA to result in up or down regulation of gene expression. We aim to identify the role of specific mRNAs in CRC progression through miRNA targeting using our unique patient-derived metastatic CRC mouse model. We expect to determine whether targeting EV-derived LN stromal cell (LNSC) miRNA and their target mRNA has additive or synergistic effects in reducing primary tumor growth and distant organ metastases in CRC.

**Methods/Interventions:** EVs were obtained from LNSC line, HK cells, and mesenteric LNSC samples using ultrafiltration. The RNA samples extracted from EVs and intact cells were then analyzed using Next Generation Sequencing revealing which miRNAs were carried at the highest levels. Potential cancer cell targets for these miRNAs were predicted using available software (mirPath v3).

**Results/Outcome(s):** HK cells, LNSC cells, and EVs from each sample were analyzed for expression of 2822 known human miRNAs. 653 miRNAs were found to be expressed on EVs from both cell preparations. The top 8 collectively expressed miRNAs were selected for further analysis: hsa-let-7i-5p, hsa-miR-21-5p, hsa-miR-22-3p, hsa-miR-26a-5p, hsa-miR-27b-3p, hsa-miR-143-3p, hsa-miR-181a-5p, and hsa-miR-221-3p. Analysis with mirPath v.3 software revealed these miRNAs to affect genes involved in genetic pathways important to CRC, including TP53, KRAS, MSH6, MSH2, BRAF, MYC, SMAD3, and APC (Table 1).

**Conclusions/Discussion:** We have shown that LNSC cells and the EVs they release contribute to CRC tumor growth and spread. Here we show that the miRNAs carried by these EVs may play a significant role in multiple well studied oncologic pathways. We are currently analyzing CRC patient specimens of normal and tumor tissue (in different stages) as well as serum for their miRNA profiles; we will then compare them to our LNSC data to reveal miRNAs that may be introduced or enhanced in cancer cells via LNSC-derived EVs. Predictive software can show

known and potential mRNA targets of these miRNAs. We will then use gain of function and loss of function methods to regulate these miRNAs and analyze their effects on CRC *in vitro* and *in vivo*. Understanding the interactions of these miRNAs and their targets in CRC may allow for the creation of novel targeted therapies in the future.

Table 1. Pathway Analysis using the Kyoto Encyclopedia of Genes and Genomes (KEGG).

KEGG pathway	# genes affected/total genes in pathway (%)	# miRNAs involved/total miRNA of interest*	P-value
MicroRNAs in cancer	122/299 (40.8)	8/8	1.58e-68
Proteoglycans in cancer	122/205 (59.5)	8/8	1.83e-14
Cell cycle	81/107 (75.7)	8/8	6.14e-08
Transcriptional misregulation in cancer	102/180 (56.7)	8/8	4.79e-07
Focal adhesion	121/148 (81.8)	8/8	2.62e-05
Pathways in cancer	207/397 (52.1)	8/8	4.60e-05
Central carbon metabolism in cancer	42/67 (62.7)	8/8	5.24e-05
Colorectal cancer	40/62 (64.5)	8/8	0.000197

\* miRNA of interest: hsa-let-7i-5p, hsa-miR-21-5p, hsa-miR-22-3p, hsa-miR-26a-5p, hsa-miR-27b-3p, hsa-miR-143-3p, hsa-miR-181a-5p, and hsa-miR-221-3p.

## SELECTIVE LATERAL PELVIC LYMPH NODE DISSECTION IN ADVANCED LOW RECTAL CANCER.

P656

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**Purpose/Background:** The optimal treatment for lateral pelvic lymph node metastasis remains unclear. The aim of this study was to evaluate the outcomes of selective lateral pelvic lymph node dissection (LPLD) in advanced low rectal cancer.

**Methods/Interventions:** We reviewed prospectively collected database of 13 consecutive patients who underwent robotic selective LPLD for advanced low rectal cancer between February 2011 and September 2014 at Korea University Anam Hospital. LPLD was performed in patients with suspected lateral pelvic lymph node metastasis on MRI with or without preoperative chemoradiation therapy. Perioperative outcomes and oncologic outcomes were analyzed.

**Results/Outcome(s):** All patients underwent robotic selective LPLD without conversion to open or laparoscopic surgery. The median patient age was 51 years and median operation time was 337 min. Unilateral LPLD was performed in 9 patients and bilateral LPLD was performed in 4 patients. There were no case of selective LPLD related complication. Pathological lateral pelvic lymph node metastasis was confirmed in 6 patients. No local recurrence had developed and two patients had developed systemic recurrence after a mean follow-up period of 22.8 months.

**Conclusions/Discussion:** For patients with clinically suspicious lateral pelvic lymph node metastasis, it was reasonable to undergo selective LPLD. The robotic

approach was excellent alternative to open or laparoscopic procedure.

**A COMPARISON OF SINGLE- PORT LAPAROSCOPIC, CONVENTIONAL LAPAROSCOPIC, AND CONVENTIONAL ROBOTICSURGERY IN PATIENTS WITH SIGMOID COLON CANCER: IS THERE ANY REAL NEED TO HAVE SURGICAL DRAIN?**

P657

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**Purpose/Background:** Conventional laparoscopic or robotic surgery has been placed as a standard option in the treatment of of sigmoid colon cancer. Recently, advance in technology and collective accumulation of experience has enabled surgeons to do more minimized incision technique such as single port surgery. However, there is still concern regarding technical feasibility and safety of single port surgery. The aim of this study was to compare the early perioperative results among 3 different surgical methods.

**Methods/Interventions:** Between January 2010 and December 2015, patients who underwent minimally invasive surgery (MIS) for sigmoid colon cancer were retrospectively identified from patient data registered in Yonsei Colorectal Cancer Electronic Database. All consecutive patients underwent MIS for the treatment of biopsy proven adenocarcinoma arisen in sigmoid colon. Single port laparoscopic anterior resection (SLAR) was performed using specially designed multichannel port system for the entry port with 3.0 cm sized umbilical incision. Conventional laparoscopic anterior resection (CLAR) and Conventional robotic anterior resection (CRAR) were performed using multiport system. Anastomosis method was intracorporeally performed using circular stapler. Surgical drain was not used in SLAR group after surgery. Short-term outcomes including pathologic results, morbidity, and perioperative recovery were compared between 3 groups.

**Results/Outcome(s):** A total of 635 patients were assessed with the median follow-up period was 26 (0.0 – 71) months. Patients in CLAR group were 534, in CRAR group were 37, and in SAR group were 64, respectively. Mean age was not significant difference (CLAR vs. CRAR vs. SLAR = 62.48 vs. 58.35 vs. 61.22,  $p=0.072$ ), respectively. Postoperative hospital stay (7.04 days vs. 7.41 days vs. 5.92 days,  $p=0.147$ ) was not shown significant difference. ASA score and BMI were not significant different. Estimated blood loss (CLAR vs. CRAR vs. SLAR: 63.36mL vs. 77.84mL vs. 39.68mL,  $p=0.362$ ) and blood transfusion during the operation were not statistically different. Patients showed no difference in TNM stage, total lymph node retrieval. (18.76 vs. 18.03 vs. 17.16,  $p=0.401$ ) The total operation time showed

differences. (CLAR vs. CRAR vs. SLAR: 187.03 mins vs. 219.97 mins vs. 163.89 mins,  $p < 0.01$ ). Overall complication rate has no significant differences, (CLAR vs. CRAR vs. SLAR: 0.40 vs. 0.11 vs. 0.06,  $p=0.437$ ) and differences of anastomotic leakage rate has no statistically significance. (CLAR vs. CRAR vs. SLAR: 1% vs. 3% vs. 2%,  $p=0.570$ )

**Conclusions/Discussion:** Single port laparoscopic anterior resection (SLAR) with shorter operation time is comparable with CLAR and CRAR in the treatment of sigmoid colon cancer. Routine surgical drain may not be required after SLAR based on this study.

**IMPACT OF COST CONSCIOUS APPROACH AND INCREASING EXPERIENCE ON VALUE OF CARE IN ROBOTIC RESTORATIVE PROCTECTOMY FOR RECTAL CANCER.**

P658

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**Purpose/Background:** There is still debate whether this technology will translate into clinical efficiency and value of care in the setting of rectal cancer surgery. In this study, we aimed to analyze hospital costs, short term outcomes and value of care after robotic restorative proctectomy (RP) compared to open surgery in rectal cancer patients performed by high case volume colorectal surgeons.

**Methods/Interventions:** Rectal cancer patients undergoing RP between 12/2011 and 10/2014 by high volume surgeons were collected. The definition of high volume based on previous literature was >12 cases during the study period. One surgeon performed all the robotic operations and 4 performed only open surgery. A cost conscious approach was followed in robotic surgery (minimized use of robotic instruments, suction irrigators, vessel sealers etc.). Patient characteristics, short-term outcomes and hospital costs were compared between groups.

**Results/Outcome(s):** There were 100 (32 robotic) patients. Age ( $60\pm 13$  vs.  $56\pm 11$ ,  $p=0.30$ ), male gender [m: 51 (75%) vs. 22 (69%),  $p=0.51$ ], ASA score [(ASA 3-4): 68 (100%) vs. 31 (97%),  $p=0.32$ ], BMI ( $29\pm 7$  vs.  $30\pm 6$ ,  $p=0.37$ ), tumor distance from anal verge ( $8\pm 4$  vs.  $10\pm 4$ ,  $p=0.21$ ), neoadjuvant chemoradiation [39(57%) vs. 15(47%),  $p=0.33$ ], history of prior abdominal operations [n=29 (43%) vs. n=15 (47%),  $p=0.69$ ] and diverting ileostomy [51 (75%) vs. 24 (75%),  $p>0.99$ ] were comparable between open and robotic RP respectively. Operating time was significantly longer in the robotic group ( $232\pm 125$  vs.  $280\pm 56$ ,  $p=0.003$ ). Pathological stage [(Stage 3-4): 29 (43%) vs. 11 (34%),  $p=0.43$ ], tumor size ( $3\pm 2$  vs.  $2\pm 1.8$ ,  $p=0.22$ ), lymph node number ( $26\pm 16$  vs.  $27\pm 14$ ,  $p=0.39$ ), distal [4 (6%) vs. 0,  $p=0.30$ ] and radial [5(7%) vs. 2(6%),  $p>0.99$ ] margin positivity were similar between the open and robotic RP. Estimated blood loss and intraoperative blood transfusion requirements were decreased in robotic

RP. Robotic RP was also associated with decreased overall morbidity and shorter hospital stay. After the initial 5 robotic cases, overall hospital costs became comparable between the groups.

**Conclusions/Discussion:** Increasing experience and cost conscious approach may improve the value of care with reduced hospital stay, postoperative morbidity and similar hospital costs compared to open RP for rectal cancer.

#### OPPORTUNITY FOR COLORECTAL CANCER SCREENING IN A COMMUNITY HOSPITAL SURGICAL POPULATION.

P659

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**Purpose/Background:** Though colorectal cancer (CRC) has been shown to be preventable through screening measures, these continue to be underutilized. The primary care office has traditionally been the source of cancer screening counseling. Other health care systems and provider-level initiatives, such as a hospital's surgical services, could play a major role in increasing the utilization and quality of screening for CRC.

**Methods/Interventions:** All patients admitted through a community hospital's surgical services during March through May 2016 were administered an IRB approved survey. The survey consisted of five yes/no questions concerning knowledge and compliance with current CRC screening guidelines. Patient demographics and admitting surgical subspecialty were acquired using patient stickers used to label each survey. Exclusion criteria included age <50 and incomplete surveys.

**Results/Outcome(s):** There were 1469 surveys administered over 60 operative days with 344 excluded due to incomplete surveys (n=21) and age <50 (n=323). Of the completed surveys, 79.3% (n=1165) of patients meeting screening criteria had undergone colonoscopy while 20.7% (n=304) were unscreened. Of patients who had not undergone screening colonoscopy, 68.9% (n=209) were willing to have the test if recommended by a health care provider. When separated by subspecialty, 20% (n=61) of general surgery patients, 34% (n=55) of urology patient, and 19% (n=28) of orthopedic surgery patients were found to be unscreened.

**Conclusions/Discussion:** The surgical window of care could provide an opportunity to recommend screening colonoscopy to eligible patients. Surgical patients are undergoing a significant medical event and may be more aware of their need for screening. A surgical services questionnaire similar to ours could be used to identify unscreened patients and provide appropriate counseling. Integration of these questions into the electronic medical record could be a means of tracking this data.

#### IDENTIFYING PREDICTORS OF SHORT-TERM OUTCOMES IN PATIENTS FOLLOWING TRANSANAL RESECTIONS: ARE TRANSANAL ENDOSCOPIC TECHNIQUES MORE INVASIVE THAN TRADITIONAL TRANSANAL EXCISIONS?

P660

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**Purpose/Background:** Distal rectal masses have standardly been approached with transanal excisional techniques. These local excisions have allowed for both the

#### P658 Specific postoperative complications, mesorectal excision grading and hospital costs

	Open (N=68)	Robotic (N=32)	P value
Overall morbidity, n(%)	34 (50)	8 (25)	0.02
Ileus, n(%)	16 (24)	6 (19)	0.59
Urinary complications, n(%)	8 (12)	3 (9)	>0.99
Blood transfusion, n(%)	8 (12%)	0	0.04
Length of stay, d	9±7	5±3	<.0001
Readmission, n(%)	8(12)	1(3)	0.27
Reoperation, n(%)	4 (6)	2 (6)	>0.99
Overall cost by years*	n=22	n=5	
2011-2012	1±0.4	1.5±0.5	0.02
2013	1±0.8	0.96±0.3	0.14
2014	1±0.6	1.2±0.6	0.10

# Due to non-homogenous distribution estimated blood loss is presented as median (range).

\* Actual cost values are not presented due to our institution's cost privacy policy. Presented cost value was the ratio between the actual mean direct cost with standard deviation divided by actual mean direct cost of the open surgery.

treatment and sampling of these lesions, at times guiding further therapy. The improved visualization provided with standard laparoscopic instrumentation has guided the increased use of transanal endoscopic surgical (TES) techniques. The objective of this study is to compare the short-term outcomes of transanal techniques for the excision of rectal lesions, comparing standard transanal excision (TAE) with TES techniques.

**Methods/Interventions:** Data was obtained from the American College of Surgeons' National Surgery Quality Improvement Program participant use file to perform a retrospective cohort analysis. Patients over 18 years of age who underwent a TAE or TES procedure were identified from the database (2005-2012; NSQIP no longer collected information on these procedures thereafter) and tabulated. Univariate comparisons were made between the two groups. Multivariate regression models were designed for the primary outcome of all surgical complications and the secondary outcome of need for reoperation, to adjust for the effect of a priori identified confounders and to identify predictors of the outcome. This was based on a theoretical framework constructed by the authors.

**Results/Outcome(s):** During the study period, 1755 patient underwent TAE and 409 underwent a TES procedure. On univariate comparison, TES procedures were found to be longer (103 vs. 56 min;  $p < 0.01$ ) and more often performed in male, obese and diabetic patients. Furthermore, patients were more likely to be readmitted after surgery (3.4% vs. 0.1%;  $p < 0.01$ ) with no overall difference in mortality. The only predictor associated with decreased rates of surgical complications when controlling for both TES and TAE procedures was benign diagnoses (as compared to malignant; OR 0.34; 0.16-0.71,  $p < 0.01$ ). When assessing the outcome of reoperations on multivariate analysis, male sex was associated with increased rates (OR 1.6,  $p = 0.04$ ), whereas a benign diagnoses were associated with lower rates of reoperation (OR 0.47,  $p < 0.01$ ). No increased rate of surgical complications or reoperations was observed to exist with either of the two procedures (TES or TAE).

**Conclusions/Discussion:** TES techniques are increasing in utilization for rectal lesions allowing for high magnifications of full thickness resections to be performed for benign and malignant rectal lesions. Our study suggests this procedure to be equally safe in performing these resections with no difference in short-term outcomes when controlling for various confounders. Larger population database studies are necessary to also compare long-term recurrence and oncologic outcomes of these procedures in pre-malignant and malignant lesions, respectively.

## PATHOLOGIC FEATURES AND CLINICAL OUTCOMES OF RECTAL GASTROINTESTINAL STROMAL TUMORS.

P661

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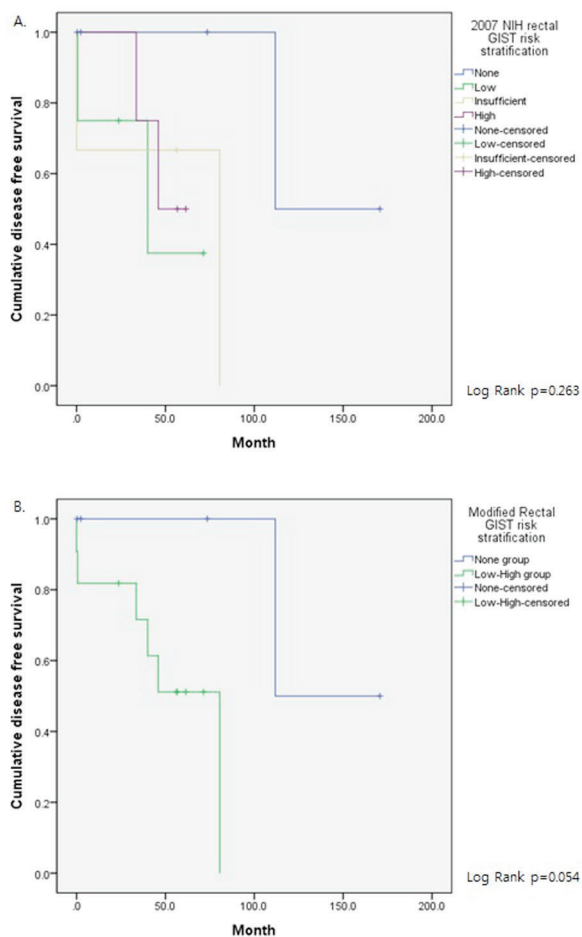
**Purpose/Background:** Gastrointestinal stromal tumor (GIST) is the most common malignant mesenchymal tumor in the gastrointestinal tract. The occurrence rate of GIST is highest in stomach and small bowel, but lowest in rectum and esophagus. Therefore, clinical course and prognosis of rectal GIST is not well known. The aim of this study is to assess the pathologic features and clinical outcomes of rectal GISTs

**Methods/Interventions:** Between January 2000 and September 2016, 17 patients who underwent surgical treatment for rectal GIST were enrolled prospectively, and we reviewed the medical records retrospectively. All patients underwent histopathologic examination and immunochemistry study. The risk stratification was performed according to the NIH 2007 guideline. The group, which was characterized by tumor size  $5 < \leq 10$  and mitotic count  $> 5$  per 50 HPF, was classified to high recurrence group

**Results/Outcome(s):** The mean age was 58.5 years old (range, 37-73 years) and 12 patients (70.6%) were male. Two (11.8%) patients had received imatinib treatment before surgery. One had synchronous metastasis, and the other had huge tumor size. Trans-anal local excision was performed in nine patients (52.9%), low anterior resection or ultra-low anterior resection was done in five patients (29.4%), and mass excision from abdominal approach was in three patients (17.6%). R0 resection was performed in seven patients (41.2%) and uncheckable resection margin in pathologic report was in five patients (29.4%). Median tumor size was 3.5cm [1.95-7.9 cm] and median mitotic count per 50 high power field was 3.0 [1.0-10.0]. All tumors were expressed in CD 34 and CD 117 as positive. Median Ki-67 index was 1 (range, 1-7). Five patients (29.4%) were classified in none group, four (23.5%) in low group, three (17.6%) in insufficient group and five (29.4%) in high group. Median follow-up period was 71.4 months [0.3-170.7 months]. Five patients (29.4%) received adjuvant imatinib treatment, and seven patients (41.2%) had tumor recurrence. The treatment for recurred tumor was further resection of tumor in six patients (35.3%) and/or imatinib treatment in six patients (35.3%). Median disease free survival (DFS) was 80.5 months (0.5-170.7) and the 5 year overall survival rate was months 91%. The 5 year overall survival was not different between recurred patients and not recurred patients (100 vs 80%.  $p = 0.317$ ). Although difference of DFS according to risk stratification was not statistical significance, none group tended to have

better DFS than other groups. (111.8 vs 80.5 months,  $p=0.054$ ) (Figure 1)

**Conclusions/Discussion:** Rectal GISTs had relatively high rate of recurrence. However, overall survival rate was not worse in recurred patients. We only verified that none risk group show better outcomes in DFS. Further research with large number of patient cohort is necessary.



**Figure.** Disease free survival (DFS) according to NIH rectal GIST risk stratification. A: DFS according to NIH risk stratification was not statistically significant difference. B: DFS between none and other groups in risk stratification had trend.

## NOMOGRAM PREDICTION OF ANASTOMOTIC LEAKAGE AND DETERMINATION OF AN EFFECTIVE SURGICAL STRATEGY FOR REDUCING ANASTOMOTIC LEAKAGE AFTER LAPAROSCOPIC RECTAL CANCER SURGERY.

P662

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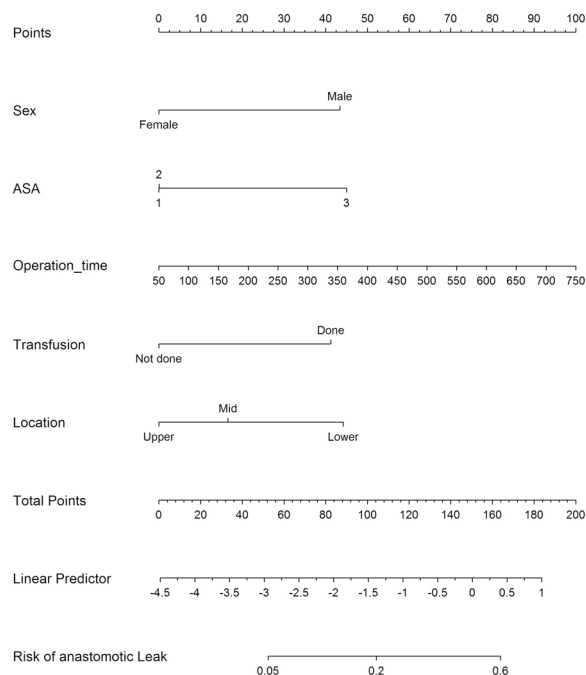
**Purpose/Background:** Although many surgical strategies have been used to reduce the anatomotic leak (AL) rate after laparoscopic rectal cancer surgery, limited data are available on the risk factors for AL and the effective strategy to reduce AL. We aimed to construct a nomogram

for predicting AL and determine a potential surgical strategy for reducing AL.

**Methods/Interventions:** The present study enrolled 736 consecutive patients who underwent laparoscopic resection without a diverting stoma for rectal adenocarcinoma. A nomogram was constructed to predict AL. Based on the nomogram, personalized risk was calculated and sequential surgical strategies were monitored using risk-adjusted cumulative sum (RA-CUSUM) analysis.

**Results/Outcome(s):** Among the 736 patients, clinical AL occurred in 65 patients (8.8%). Sex, American Society of Anesthesiologists score, operation time, blood transfusion, and tumor location were identified as significant predictive factors for AL. Based on these factors, a nomogram was created to predict AL, with a concordance index (C-index) of 0.753 (95% confidence interval, 0.690–0.816). A calibration plot showed good statistical performance on internal validation (bias-corrected C-index of 0.742). The RA-CUSUM curve showed that extended splenic flexure mobilization (SFM) could be a most influential strategy to reduce AL.

**Conclusions/Discussion:** Our nomogram for predicting AL after laparoscopic rectal cancer surgery might be helpful to identify the individual risk of AL. Furthermore, extended SFM might be the most appropriate strategy for reducing AL in patients treated with laparoscopic rectal cancer surgery.



### LONG-TERM RESULTS IN STAGE II AND III TRANSVERSE COLON CANCER WITH RADICAL D3 LYMPHADENECTOMY.

P663

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**Purpose/Background:** The surgical type or approach varies for transverse colon cancer largely depending on the surgeons' preference. However, it has an evidence that D3 lymphadenectomy for favorable long-term outcomes. The aim of this retrospective study was to analyze the short- and long-term outcomes following radical D3 lymph node dissection in stage II and III transverse colon cancer.

**Methods/Interventions:** Between May 2006 and December 2014, all patients were treated for stage II and III transverse colon cancer. This is a retrospective study of prospectively collected data of a tertiary teaching hospital. Radical D3 lymphadenectomy includes the principal nodes of middle colic artery, which is numbered as 223 defined by the Japanese Classification of Colorectal Carcinoma.

**Results/Outcome(s):** A total of 144 patients were included, of whom 110 (76.4%) performed laparoscopically, 124 underwent extended right hemicolectomy. Tumors were located at hepatic flexure (63, 43.8%), transverse colon (79, 54.9%), and splenic flexure (2, 1.4%). Mean operative time was 147.7 minutes with a mean retrieved lymph node of 43.7. The overall morbidity rate was 3.5% (5/144), and there was no postoperative mortality. Seventy-eight had stage II, 66 were stage III. Between the groups, vascular ( $p=0.001$ ), lymphatic ( $p=0.002$ ), and neural ( $p=0.001$ ) invasions had a significant difference. With a mean 37.5 months of follow-up, overall (94.9 vs. 75.7%,  $p=0.003$ ) and cancer-specific (94.9 vs. 83.9%,  $p=0.015$ ) survival at 5-years were different statistically.

**Conclusions/Discussion:** Radical D3 lymphadenectomy of transverse colon cancer has an acceptable morbidity and favorable oncologic outcomes for stage II and III.

### A SLIGHT MODIFICATION OF REGIONAL LYMPH NODE CATEGORY ACCORDING TO THE MAIN LNS AND LATERAL LNS INVOLVEMENT SIGNIFICANTLY IMPROVED PREDICTIVE ABILITY OF TNM STAGING SYSTEM FOR COLORECTAL CANCER.

P664

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**Purpose/Background:** In the wake of the concept of aggressive lymph node (LN) dissection for colorectal cancer such as complete mesocolic excision with central vascular ligation and/or total mesorectal excision with

lateral lymph node dissection, the information concerning the cancer involvement of the LNs at the root of the feeding artery (main LNs) and those along the iliac artery (lateral LNs) may become more frequently available. We evaluated the prognostic value of the identification of cancer involvement in main LNs and/or lateral LNs in the context of the TNM staging system.

**Methods/Interventions:** We analyzed the cohort data from 22 institutions of the Japanese Study Group for Postoperative Follow-up of Colorectal Cancer. Patients who had undergone curative surgery for primary colorectal cancer (pathological stage I-III) between 1997 and 2006 were eligible for analysis. We made a slight modification of the N-category of the TNM-7th edition, i.e. if at least one positive LN is found in main LN or lateral LN, the N-category was defined as N2b regardless of the total number of positive LNs. The TNM staging systems with original N-category and this modified N-category (modified-TNM staging system) were compared based on the Akaike's information criterion (AIC), and Harrell's c-index according to the Cox's-proportional hazard model with respect to relapse-free survival. A Harrell's c-index was calculated to verify the accuracy of prediction of each staging system. The Akaike information criterion (AIC) within a Cox proportional hazard regression model were used to demonstrate the discriminatory ability of the given model for staging system. A larger c-index and a smaller AIC indicate a more desirable model for predicting outcome. Statistical calculations were performed using STATA Statistical Software: Release 14. (Stata Corporation, College Station, TX).

**Results/Outcome(s):** A total of 14,233 patients were eligible. The incidence of main or lateral LN involvement for N1a, N1b, N2a, N2b were 0.54, 2.28, 9.15 and 19.17% for colon cancer patients, while 4.39, 7.51, 13.91, and 35.04% for rectal cancer patients, respectively. The modified TNM system is superior to the original TNM in AIC and C-index as shown in the table. The modified TNM staging system is better at stratifying patients than the original edition, and is potentially more suited for accurately selecting patients with poor prognosis.

**Conclusions/Discussion:** When the information regarding main LNs and/or lateral LNs involvement are available by LN dissection or sampling, the use of this simple modification of N-category will significantly improve predictive ability of TNM staging system.



## SURGICAL RESECTION OF RECTAL CANCER: A COMPARISON OF LAPAROSCOPIC AND OPEN APPROACHES.

P665

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**Purpose/Background:** The utility of laparoscopic resection of colon cancer has been verified, with advantageous short-term outcomes including: reduced blood loss, lesser post-operative pain and swifter recovery times. Studies also suggest equivalent disease-free and overall survival outcomes between the two approaches. However, the role of laparoscopic surgery in rectal cancer is less distinct. This study aimed to establish whether patient or tumour characteristics influenced surgical modality in rectal cancer treatment, and if approach had an impact upon oncological outcome.

**Methods/Interventions:** All patients undergoing rectal cancer resection within NHS Grampian between January 2012 - December 2015 were included. A prospectively maintained pathology database was retrospectively supplemented with demographic and clinical data, comprising details of stage on imaging, neoadjuvant, operative and adjuvant treatments, recurrence and survival. Categorical data were statistically analysed using the  $\chi^2$  or Fisher's exact tests and continuous data using the Mann-Whitney test. Statistical significance was  $p < 0.05$ ; IBM SPSS 24 was used to analyse data.

**Results/Outcome(s):** 249 (62.8% male) patients were included with a median age of 67 years (IQR 57-74). 78 (31.3%) laparoscopic and 171 (68.7%) open resections were undertaken. Sex ( $p=0.763$ ) and age ( $p=0.694$ ) did not influence operative approach, and there was no

statistical difference in neoadjuvant treatment between the groups ( $p=0.164$ ). Site of rectal tumour did appear to affect surgical modality ( $p=0.001$ ), with a greater proportion of open high rectal tumour resections compared to laparoscopic (24.4%). There were also more laparoscopic low rectal tumour resections (53.8%) in contrast to open (38%). Grade 3 (good) total mesenteric excision (TME) was achieved in 116 (67.8%) open and 45 (57.7%) laparoscopic procedures, with higher levels of moderate and poor grades observed within the laparoscopic group ( $p=0.001$ ). There was equivalence in tumour excision ( $p=0.214$ ) and clear circumferential resection margins (CRM;  $p=0.335$ ) between the groups. Mean lymph node yield was higher in open resections (21.8, range 4-53) compared to laparoscopic (19.35, range 8-44;  $p=0.009$ ) and frequencies of tumour stage in each group were similar ( $p=0.423$ ).

**Conclusions/Discussion:** Site of rectal tumour influenced laparoscopic or open approach. Whilst oncological outcomes were comparable between groups with similar rates of tumour excision and clear CRM, there was disparity in TME grades, with more high quality specimens produced from open resections. Higher lymph node yield were also possible with open resections. More long-term analysis of recurrence and survival are required.

### P664 Objective comparisons between the staging systems

Staging system	AIC	C-index
All (n=14233)		
TNM	59700	0.6546
modified TNM	59666	0.6559*
Stage III (n=5262)		
TNM	31213	0.6156
modified TNM	31180	0.6221*
Stage III colon cancer (n=3624)		
TNM	18499	0.6074
modified TNM	18496	0.6102*
Stage III rectal cancer (n=1638)		
TNM	10101	0.6317
modified TNM	10083	0.6395*

\*  $p < 0.001$  vs. TNM,

AIC: Akaike's information criterion,

C-index: Harrell's c-index,

A smaller AIC and a larger c-index indicate a more desirable model for predicting outcome.

### THE PROGNOSTIC ROLE OF LYMPH NODE RATIO(LNR) AND OTHER INDICATORS IN PATIENTS UNDERGOING POTENTIALLY CURATIVE RECTAL CANCER RESECTION.

P666

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**Purpose/Background:** The presence of malignant lymph nodes associated with rectal cancer has been recognised as a strong indicator of poor prognosis in terms of further dissemination of disease, recurrence and survival. Indeed identification of malignant lymph nodes is used to stage disease and guide adjuvant treatment. Studies have indicated lymph node ratio (LNR), the number of malignant lymph nodes proportional to total lymph node yield, may be a superior prognostic indicator. However, studies predominantly relate to colon or colorectal cancer, with limited data on LNR purely in rectal cancer. Other prognostic factors in colon cancer include age, tumour stage and extramural vascular invasion (EMVI). We determined the role of LNR in rectal cancer prognosis, and aimed to identify further predictors of survival.

**Methods/Interventions:** All patients undergoing rectal cancer resection within NHS Grampian between January 2012 - December 2015 were included. A prospectively maintained pathology database was retrospectively supplemented with demographic and clinical data, comprising details of stage on imaging, neoadjuvant, operative and adjuvant treatments, recurrence and survival. LNR was categorised by previously defined cut-off values. Categorical data were statistically analysed using the  $\chi^2$  or Fisher's exact tests and continuous data using the Mann-Whitney test. Statistical significance was  $p < 0.05$ ; IBM SPSS 24 was used to analyse data.

**Results/Outcome(s):** 247 (61.5% male) patients were included with a median age of 67 (IQR 58-75). 159 (64.4%) patients received neoadjuvant treatment: 102 (41.3%) chemoradiotherapy; 43 (17.4%) radiotherapy and 14 (5.7%) chemotherapy. Tumour was completely excised in 220 (89.1%) patients. 129 (52.2%) tumours were T3, which was the most frequent pT stage, and 182 (73.7%) resections were pN0, 41 (16.6%) were pN1 and 24 (9.7%) were pN2. 78 (31.6%) specimens had EMVI. The median number of lymph nodes excised was 20 (15-25). Higher LNR category was significantly associated with poorer survival ( $p=0.012$ ). This statistical difference was maintained in those patients who underwent neoadjuvant treatment ( $p=0.033$ ), however it was not in patients who had no neoadjuvant treatment ( $p=0.128$ ). Mortality did rise with increasing pN stage, however this did not reach statistical significance ( $p=0.145$ ). Age ( $p<0.001$ ), EMVI ( $p=0.012$ ) and rising pT stage ( $p=0.051$ ) were related to reduced survival, whilst sex ( $p=0.720$ ), excision of

tumour ( $p=0.398$ ) and neoadjuvant treatment ( $p=0.856$ ) were not.

**Conclusions/Discussion:** To our knowledge this is the largest UK single centre study examining LNR in rectal cancer. LNR was confirmed to be a prognostic indicator in rectal cancer, and in contrast to a previous paper, statistical significance was found between LNR categories in patients who underwent neoadjuvant treatment, although this was not paralleled in the non-adjuvant group.

### THE MANAGEMENT OF RECTAL-VAGINAL ENDOMETRIOSIS – A NOVEL SCORING SYSTEM IN AN ACCREDITED SPECIALIST CENTRE.

P667

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**Purpose/Background:** The laparoscopic surgical treatment of recto-vaginal endometriosis is challenging and needs to be planned and managed by a multidisciplinary team that includes colorectal, urological as well as gynaecological surgeons and the radiology team. In our institution a novel scoring system is used prior to surgery to help predict which surgeons need to be present based on a preoperative assessment by the multidisciplinary team. A score of 1 requires another surgeon to be on stand-by, but can have other clinical commitments, 2 necessitates a surgeon to be on stand-by with only clerical commitments and a score of 3 requires an additional surgeon to be present during the operation.

**Methods/Interventions:** A prospective database was compiled of all patients undergoing laparoscopic surgery for excision of recto-vaginal endometriosis. Prior to surgery a 'Severity Score' was recorded for each patient in their pre-operative clinic letter based on clinical, radiological and endoscopic examination. After surgery intraoperative records were then checked to see in what proportion of surgeries graded as 1,2 or 3 a further speciality was required. This was then analysed to assess the service provided at our institution for laparoscopic treatment of rectal-vaginal endometriosis.

**Results/Outcome(s):** Between January 2014 and September 2016 a total of 63 patients underwent laparoscopic surgery for excision of recto-vaginal endometriosis. A total of 9 patients were graded as 1, 36 patients as 2 and 15 patients as 3. According to the intra-operative records, in 44% of cases classed as Colchester 1, another specialty was present; 22% in cases classified as Colchester 2; and 26% of cases classified as Colchester 3.

**Conclusions/Discussion:** From the data collected there appears to be no correlation between the score given to a patient prior to surgery and whether another specialty was present during the operation. One possible explanation is

that an additional surgeon was present but this was not noted in the record of the operation. This scoring system has the potential to improve safety and better organise resources during complex cases, but requires further modification and analysis.

### COMPARING COLECTOMY TRENDS IN A SINGLE COMMUNITY INSTITUTION FOR DIVERTICULITIS AND COLON CANCER USING ACS NSQIP DATA.

P668

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**Purpose/Background:** Performed nearly 600,000 times yearly, the partial colectomy is an essential procedure for any colorectal or general surgeon. One of the difficulties in evaluating outcomes is the wide variety of indications, patient populations, modalities and post-operative pathways. A previous 2013 study by Van Arendonk et al found significantly worse outcomes after elective colon resection in patients with diverticulitis compared to those with colon cancer. By comparing the demographics and perioperative care of these two groups, and then comparing their postoperative outcomes, this study aims to identify areas that can be targeted for improvement.

**Methods/Interventions:** Retrospective review of NSQIP data from 2012-2014 of a single community institution to identify patients diagnosed with colon cancer or diverticulitis who underwent a left sided partial colon resection. Statistical Chi-square or Kruskal-Wallis tests were performed to characterize the group and perioperative management strategies. The groups were then compared in terms of operative approach (open, laparoscopic and robotic), and post-operative course including complications such as pneumonia, urinary tract infection and rate of anastomotic leak.

**Results/Outcome(s):** Of the 551 patients who had left-sided partial colectomies, 343 (62.2%) had diverticular disease and 208 (37.7%) colon cancer. The diverticulitis group was younger on average ( $p < 0.001$ ), with a median of 57 (range 28-90) vs. 65 (range 32-90) in the cancer group. An increased incidence of diabetes mellitus was noted in the diverticulitis group ( $p = 0.002$ ); however, there was a higher incidence of COPD ( $p = < 0.001$ ) and dyspnea on exertion ( $p = 0.005$ ) in the cancer group. With regards to operative approach, 60% of these cases were performed laparoscopically, 35% open and 4.3% robotically. Overall, there were a higher percentage of laparoscopic surgeries performed for diverticulitis, compared to a higher percentage of open surgeries for cancer. There was also a statistical difference in wound classification, with a higher number of Class 2 or 3 wounds in the diverticulitis group. There was a statistical difference in location upon discharge with more diverticulitis patients going home

( $p = 0.03$ ), and an increased incidence of ileus ( $p = 0.006$ ) in the cancer group. There was no statistical difference in the 30 day readmission, death or anastomotic leak rate.

**Conclusions/Discussion:** Though diverticular disease and colon cancer represent two very different pathologies, their primary surgical treatment is the same. Despite a higher average age, increased incidence of COPD and dyspnea on exertion in the cancer group, the majority of the outcomes were not statistically different. This is different from previously published reports. These findings would benefit from further evaluation with a larger patient population to identify patient characteristics that could be optimized prior to surgery.

### THE EVOLUTION OF COLORECTAL SURGERY LAPAROSCOPY IN A TEACHING INSTITUTION.

P669

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**Purpose/Background:** The development of videolaparoscopic surgery has changed the way we perform surgery. Its benefits are clearly visible in any service with surgeons qualified with this access route. There are currently few restrictions on the routine use of laparoscopic access. However, at the beginning of the experiment, this access route was only for selected cases. Objective: To present the evolution of laparoscopic colorectal surgery in the surgery department of the colon and rectum of Hospital das Clínicas of the Faculty of Medicine of the University of São Paulo from 1995 to 2016.

**Methods/Interventions:** Retrospective analysis with a prospectively collected database of 596 patients submitted to laparoscopic colorectal surgery, in relation to the type of surgical resection performed, intra and postoperative complications (PO), conversion rate, mortality and surgical time throughout the series.

**Results/Outcome(s):** Of the 596 surgeries performed, 269 were from 1995 to 2011 and 327 from 2012 to 2016. A total of 340 left colectomies and rectosigmoidectomies (57.1%), 144 right colectomies (24.2%), 37 total proctocolectomies with or Without ileal pouch (6.2%), 29 total colectomies (4.9%), 29 perineal rectus abdominis amputations (4.9%), 10 sacropromus rectum with or without screen (1.7%) and 7 Other unclassified resections (1.2%). The mean age of the patients was  $57.9 \pm 15.1$  years, being 223 males (37.4%) and 373 females (62.6%), mean BMI of  $26.65 \pm 4.6$ . The mean time of surgery was  $243.8 \pm 95.5$  minutes. Intraoperative complication in 28 cases (4.7%), conversion of 46 cases (7.7%). Surgical complications up to the 30th postoperative period were classified according to the Clavien-Dindo scale. Of the 596 patients, 411 had no surgical complications (69%), 63 had grade I complications (10.6%), 56 grade II complications (9.4%), 6 grade

IIIa complications (1.0%), 28 complications Grade IIIb (4.7%), 14 complications grade IVa (2,3%), 7 complications grade IVb (1,2%) and 11 complications grade V (1,8%). Anastomosis dehiscence occurred in 46 (7.7%) cases and reoperation in 46 (7.7%) patients.

**Conclusions/Discussion:** The results of laparoscopic resections in educational institutions are in agreement with the major world centers, even including initial experience, showing the safety and feasibility of this access route.

### “LET’S TAKE PAUSE”: THE ARGUMENT AGAINST INITIAL OPERATIVE MANAGEMENT IN ACUTE DIVERTICULITIS.

P670

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**Purpose/Background:** Over recent decades, acute diverticulitis has become more frequent, in both younger and older populations. Historically, earlier operative intervention was common but now, a more conservative approach has been advocated. However, there is still no consensus. The objective of this study is to define the more recent prevalence, characteristics and associated outcomes of patients treated operatively vs non-operatively for acute diverticulitis.

**Methods/Interventions:** The Healthcare Cost and Utilization Project (HCUP) State Inpatient Database (SID) for California 2006-2011 was queried using ICD-9 diagnosis and procedure codes to identify patients with diverticulitis who underwent nonoperative (defined as no surgery within 30 days of initial presentation) or operative (surgery at initial or within 30 days of presentation) management. Hospital data was acquired using the AHA Annual Survey data for 2011. The primary outcome was mortality. Secondary outcomes include length of stay, disposition and complications. Propensity matched groups were created. Univariate and multivariable analyses were conducted with logistic regression.

**Results/Outcome(s):** Of the 545,083 patients identified, 7% (36,488) patients underwent surgery and 93% (509,315) comprised the non-operative group. Operative patients were younger, more likely male and more likely to be white/non-Hispanic ( $p<0.001$ ). The operative group were more likely obese and smokers, although less likely to have hypertension or diabetes. The Charleston Co-morbidity Index was significantly lower in the operative group. Those who underwent surgery were more likely to be at hospitals with higher surgical volume, more ICU beds and more residents ( $p<0.001$ ). However, patients who underwent surgery had a 2.7 increase in adjusted odds of mortality compared to the non-operative group (1.5% vs 3.8%,  $p<0.001$ ). Median length of stay (4 vs. 8 days,  $p<0.001$ ), non-home discharge ( $p<0.001$ )

and readmissions were all higher in the operative group ( $p<0.001$ ). Additionally, patients who underwent surgery were more likely to experience complications, including sepsis (aOR 4.9\*), DVT (aOR 2.5\*), PE (aOR 2.6\*) and MI (aOR 4.5\*).

**Conclusions/Discussion:** Overall, propensity-matched patients undergoing operative treatment for acute diverticulitis were more likely to have worse outcomes, higher readmissions and mortality compared to those treated conservatively. Although we cannot definitely control for severity of disease at initial presentation, operative population does not appear sicker, older, have more abscesses or hemorrhage, have less access to care or present to lower volume hospitals that could explain the significantly worse outcomes. Thus, development of a treatment algorithm for acute diverticulitis with a focused initial conservative approach, when possible, may lead to improved surgical outcomes and decreased health care costs.

Figure 1. Baseline patient and hospital characteristics.

Baseline Patient Characteristics	Patients without Surgical Intervention (TICOP_GROUP=0)	Patients with Surgical Intervention (TICOP_GROUP=1)	P value
<b>Age</b>	69.7±15	61.4±15	<0.001
<b>Sex</b>			
Male	42.8%	48%	<0.001
Female	57%	51.5%	
<b>Race</b>			
White	66.6%	73.1%	<0.001
Black	7.52%	4.2%	<0.001
Hispanic	19.4%	18.3%	<0.001
Other	6.5%	4.4%	<0.001
<b>Insurance</b>			
Medicare	64.3%	41.4%	<0.001
Medicaid	7.2%	6.4%	<0.001
Self-Pay	23.8%	45.6%	<0.001
Other	4.7%	6.6%	<0.001
<b>Comorbidities</b>			
Diabetes	18.5%	13.1%	<0.001
HTN	63.3%	48.7%	<0.001
Obesity	12.2%	14.8%	<0.001
Smoking	8.4%	11.2%	<0.001
Renal Failure	15.1%	6.8%	<0.001
<b>Charlson Comorbidity Index (CCI)</b>	1.7 ±1.9	1.1 ±1.8	<0.001
<b>Severity of Diverticulitis</b>			
Diverticulitis WITHOUT abscess or hemorrhage	94.5%	5.5%	<0.001
Diverticulitis WITH abscess or hemorrhage	87.9%	12.1%	<0.001
<b>Baseline Hospital Characteristics</b>			
	Patients without Surgical Intervention (TICOP_GROUP=0)	Patients with Surgical Intervention (TICOP_GROUP=1)	P value
<b>Hospital Composite Score</b>	2.27±1.5	2.44±1.6	<0.001
<b>High Number of ICU Beds</b>	33.2%	34.8%	<0.001
<b>High Surgical Volume</b>	49.5%	54.1%	<0.001
<b>Mean Number of Residents</b>	40.2	45.4	<0.001

### AN OVERVIEW OF QUALITY OF LIFE IN PATIENTS REQUIRING STOMA FORMATION IN UNIVERSITY COLLEGE HOSPITAL GALWAY.

P671

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**Purpose/Background: AIM:** The aim of this study was to identify factors affecting quality of life (QOL) in patients requiring stoma formation. We wished to identify any variances in QOL in patients with Colostomies versus Ileostomies versus Ileal conduit with the intention of identifying modifiable factors.

**Methods/Interventions: METHODS:** A prospective analysis of stoma patients' database for their post op quality

of life was performed. The database included patients who underwent stoma creation surgery from January 2012 to Oct 2015 in university college hospital Galway. Patients were posted colour coded stoma specific validated quality of life (QOL) questionnaire. Other data points collected included – stoma specific complications, pre-operative stoma siting, weight, and available social support.

**Results/Outcome(s): RESULTS:** 284 patients were eligible for inclusion. 184 (64%) patients responded. Mean QOL score was 56/80. There was a significant difference in total QOL score in patients with a stoma specific complication versus those without ( $P = 0.017$ ). Factors such as patient weight, social support, age, gender, elective vs. emergency surgery, malignant vs. benign disease, temporary vs. permanent stoma and pre-operative stoma siting were not found to impact QOL score. Commonest stoma specific complication reported was parastomal hernia in colostomy in ileal conduit group, while skin problem were commonest in ileostomy group

**Conclusions/Discussion: CONCLUSION:** The need for stoma formation is a life changing event. While QOL is reduced for the majority of patients requiring stoma formation there is no significant difference for those requiring Colostomies versus Ileostomies versus Ileal conduit. Patients suffering stoma related complications had a statistically significantly reduced QOL. Thus adherence to optimal surgical technique to reduce stoma related complications is important.

#### DOES A SURGEON'S PROCEDURE MIX IMPACT PATIENT SATISFACTION SCORES: WHAT ARE WE REALLY MEASURING?

P672

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**Purpose/Background:** Web-based physician rating sites aim to make patient satisfaction data more practical to collect and transparent to patients. Given the rising utilization of these review sites, we examined the relationship between surgeon procedure mix and patient satisfaction scores obtained through web-based physician reviews.

**Methods/Interventions:** We conducted a cross-sectional observational study of all colorectal surgeons recertifying through the American Board of Colon and Rectal Surgery (ABCRS) maintenance of certification process. Data on colorectal surgeon procedure mix was determined from self-reported case logs. Surgeon procedure mix was determined based on percent of annual volume comprised of: anorectal, endoscopic, and/or abdominal procedures. We also calculated the annual proportion of abdominal cases that were performed laparoscopically. Next we abstracted patient satisfaction scores through web-based physician reviews for all recertifying surgeons from publicly available websites (Vitals,

Healthgrades, and UCompare). Surgeons were grouped as 'high performers,' 'average performers', or 'low performers' based on mean website ratings. Student's t-tests were used to evaluate for associations between web-based physician reviews and surgeon procedure mix.

**Results/Outcome(s):** A total of 711 surgeons recertified during the years of 2006-15, for which 689 (96.9%) had adequate physician web-based review scores for analysis. The mean annual submitted volume was 992 +/-665 procedures. The mean procedure mix was 32 +/-16% anorectal, 48 +/-21% endoscopic, 20 +/-15 abdominal of which 34 +/-23% were laparoscopic. Surgeons had an average of 40 +/-28 website ratings, with a mean rating of 4.1 +/-0.6. A total of 94 surgeons were grouped as 'low performers' for an average physician rating < 3.6, and 82 surgeons were grouped as 'high performers' for an average physician rating > 4.8. Surgeons who were 'low performers' had a significantly larger anorectal procedure mix (33.6%, SD 0.18) than surgeons that were grouped as 'high performers' (27.5%, SD 0.13) ( $p = .005$ ). There was no significant association between web-based surgeon review scores and proportion of abdominal cases performed laparoscopically, annual case volume, or number total number of web-based reviews.

**Conclusions/Discussion:** Among recertifying surgeons of the ABCRS, those that were low performers on web-based physician reviews had a proportionally higher anorectal procedure-mix when compared to high performers. As patients and referring physicians increase their utilization of web-based reviews, these results may discourage colorectal surgeons from focusing on anorectal procedures.

#### CURRENT PERIOPERATIVE MANAGEMENT OF THE COLORECTAL SURGERY PATIENT: AN ASCRS SURVEY.

P673

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**Purpose/Background:** Changes in the preoperative management have been recommended by specialized centers. However, little is known on how widely these practices have been adopted.

**Methods/Interventions:** To provide insight into current practices, two e-mailings (February 5 and 25, 2016) were sent to 2,200 US ASCRS members. We received 309 survey responses (14.05%). To evaluate changes in practice over time, we used the Chi-square test to compare current practice rates to those reported in prior studies. Statistical analysis were performed with Stata 14.2.

**Results/Outcome(s):** Respondents' age ranged 33-70 yrs (avg 47.7) and 79.5% were male. 58.9% were FASCRS and 88.3% were board certified. Practice regions: NE 28.5%, SE 14.9%, SW 13.9%, NW 5.8% other 25.2%. Practice type: Private 31.1%, Group 32.47%, Academic

38.8%, and Military 1.0%. Perioperative management practice response rates are described in the table. Of the 217 who reported using preoperative nutritional assessments: 93.5% used history, 82.5% lab tests, and 9.7% other types. Of the 260 using mechanical bowel cleansing 41.5% used small volume, 41.2% large volume, and 29.6% cathartics. For pain management, 49.5% used only opioids, 20.1% liposomal bupivacaine, 20.7% IV ibuprofen, 37.8% IV acetaminophen, and 68.7% a multimodality approach. Discharge criteria: Diet tolerance 89.0% (regular 68.0%, liquids 25.5%, other 6.6); Bowel function 89.0% (78.0% required flatus and 22.1% a bowel movement). Compared to prior reports (Beck & Fazio 1990; Zmora et al 2003) the rate of mechanical bowel cleansing (84.1%) has significantly decreased from 1990 (100 %,  $p<0.01$ ) and 2003 (90%,  $p=0.02$ ). Oral antibiotic use (59.9%) has significantly decreased from 1990 (87%,  $p<0.01$ ) and increased from 2003 (49%,  $p<0.01$ ). There as no significant change in IV antibiotic use (91.6%) from 1990 (90%,  $p=0.49$ ) or 2003 (89%,  $p=0.22$ )

**Conclusions/Discussion:** The majority of respondents use enhanced recovery, mechanical bowel cleansing, intravenous and oral antibiotics. Preoperative nutritional assessment, carbohydrate loading and gum chewing are less frequently used.

#### SURGICAL NUTRITIONAL SCORE (SNS) IS A NOVEL PREDICTIVE FACTOR OF POSTOPERATIVE COMPLICATIONS.

P674

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**Purpose/Background:** Objective: To evaluate the relationship between Surgical Nutritional Score (SNS) and postoperative complications in colorectal cancer (CRC) patients. Background: It is reported that preoperative

nutritional state is related to postoperative complications. We used basal energy expenditure (BEE) and prognostic nutritional index (PNI) as an index of preoperative nutritional state and made the SNS, which is calculated based on the BEE and PNI.

**Methods/Interventions:** The study included 1032 consecutive CRC patients who had undergone curative resection between January 2004 and December 2012. The SNS was categorized based on the cutoff value of BEE and PNI. Our outcome of interest was defined as postoperative complication. Their cutoff values were calculated by Receiver Operating Characteristic curve. We evaluated the influence of SNS on postoperative complications using logistic regression analysis.

**Results/Outcome(s):** Patients consisted of 613 men (59.4%) and 419 women (40.6%), the median age of the patients was 67 (range: 23-95) years. Postoperative complications were observed in 258 patients (25.0%). The cutoff value of BEE and PNI was calculated 943.2 and 46.6 respectively. Consequently, the categories of SNS were defined as follows; SNS=0 is BEE>943.2 and PNI>46.6, SNS=1 is BEE%943.2 or PNI%46.6, SNS=2 was BEE%943.2 and PNI%46.6. The SNS distribution was SNS=0: 62.3%, SNS=1: 34.5%, and SNS=2: 3.2%. Multivariate analysis revealed that an increased SNS was an independent predictive factor of postoperative complications (SNS=1: OR=1.66 [95%CI: 1.15-2.40]  $p=0.007$ ; SNS=2: OR=13.26 [95%CI: 4.95-35.49]  $p<0.001$ ). Moreover, in the analysis for pattern of complications, the SNS was significantly related to infectious complications such as SSI and pneumonia.

**Conclusions/Discussion:** The SNS was considered a novel predictive factor of postoperative complications, especially infection-related complications in CRC patients. Moreover, the SNS is a nutrition and immune-based factor, which may improve the clinical outcomes.

#### P673

Category	# respondents	Always	Always	Never
Enhanced Recovery	309	53.8%	31.1%	16.2%
Preoperative nutritional assessment	304	19.4%	52.0%	28.6%
Carbohydrate loading	300	22.7%	19.7%	57.7%
Mechanical cleansing	276	58.7%	35.5%	5.8%
Antibiotics IV	284	93.7%	6.0%	0.4%
Oral	282	47.9%	17.7%	34.4%
Both	279	47.0%	17.2%	35.8%
Postop	277	26.0%	29.2%	44.8%
Alvimopam	289	31%	21%	49%
Intraop fluid restriction	275	46.9%	32.4%	20.7%
Postop fluid restriction	275	53.5%	33%	14.2%
Postop Gum chewing	275	25.5%	23.6%	50.9%

## ROBOTIC-ASSISTED RESECTION FOR RECTAL CANCER: A DESIGNATED CANCER CENTER'S EXPERIENCE AFTER THE INTRODUCTION OF A ROBOTIC PROGRAM.

P675

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**Purpose/Background:** The scope of robotic surgery has broadened to include its current role in total mesorectal excision (RTME). Short term and mid-range data suggests that RTME is at least comparable to laparoscopic total mesorectal excision (LTME) and open total mesorectal excision (OTME) in terms of oncological outcomes and complication profile. The objective of this study was to determine the short-term outcomes after implementation of a robotics program when compared to laparoscopic assisted or open surgery for rectal cancer.

**Methods/Interventions:** We reviewed our available NSQIP data at a single institution to compare RTME with LTME and OTME outcomes over a 5 year time period using univariate and multivariate analysis.

**Results/Outcome(s):** Results: NSQIP data was available for a total of 95 LAR's performed over the 5 year period; 36 robotic, 17 laparoscopic, and 42 open cases. Average age of robotic and open/laparoscopic patients were 60.7 +/- 15.7 and 64 +/- 13.9 (p=.288) Co-morbidities between the groups were similar except for higher pre-existence of hypertension in the open/laparoscopic group. Operative duration of surgery were statistically less in the robotic limb with 197 +/- 83 minutes versus 239 +/- 102 minutes in the combined open/laparoscopic groups (p=.034). There were also less surgical site infections with 1% and 15% (p=.004) and length of stay 5 +/- 2.9 days and 7 +/- 4.1 days in the two groups, respectively.

**Conclusions/Discussion:** Implementing a robotics program for rectal cancer is safe and can lead to improved outcomes with less operative time, decreased wound infections, and decreased length of stay.

## LAPAROSCOPIC SURGERY FOR COLORECTAL CANCER IN VERY ELDERLY PATIENTS: THE GALLIERA HOSPITAL EXPERIENCE.

P676

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**Purpose/Background:** Colorectal cancer is one of the most common malignancy in general population with higher incidence in older age. Surgery remains the treatment of choice and laparoscopic approach could offer numerous benefits. The use of laparoscopic surgery in very elderly patients remains controversial, because some studies reported that longer operative time, extreme Trendelenburg position and pneumoperitoneum resulting

from laparoscopic surgery may increase postoperative mortality and morbidity. Conversely, other studies showed that laparoscopic surgery reveals earlier mobilization, bowel recovery, and a shorter length of stay, resulting in less morbidity and mortality, particularly in high-risk patients. These frail subjects are often not included in randomized studies. We report our personal experience in very elderly patients ( $\geq 85$  years old) operated for colorectal cancer with laparoscopic resection in the last 5 years.

**Methods/Interventions:** From January 2011 to December 2015 we performed 107 resections for colorectal cancer in patients aged 85 years or older, 37 of them (34.6%) with a laparoscopic approach. 21 patients were males, 16 females with a male/female ratio of 1.3. Mean age 85.7 years (range 85-92). ASA II score in 22 patients (59.5%) and III in 15 patients (40.5%). Neoplastic lesions were located at the descending-sigmoid colon in 7 patients (18.9%), intraperitoneal rectum was involved in 5 (13.5%), extraperitoneal rectum in 8 (21.6%), ascending colon in 13 (35.1%), and flexures/transverse colon in 4 (10.8%).

**Results/Outcome(s):** All patients were treated laparoscopically, only in 2 cases (5.4%) we converted to an open approach (1 for adhesions; 1 for duodenum infiltration); 14 (37.8%) underwent right colectomy, 3 (8.1%) right colectomy extended to transverse, 7 (18.9%) left colectomy, 10 (27%) anterior rectal resection (6 with a protective ileostomy), 1 (2.7%) Hartmann procedure and 2 (5.4%) abdominoperineal resection. Mean operative time was 158.5 minutes. Mean bowel recovery time was 3.5 days and mean hospital stay was 10.4 days (range 3-63). Major post-operative complication occurred in 10 cases (27%), and in particular 4 patients presented medical complications (1 pulmonary embolism, 1 respiratory insufficiency, 1 cardiac insufficiency, 1 stroke) and 6 presented surgical complications (2 occlusions, 2 clinical anastomotic leakages, 2 radiological anastomotic leakages), 4 of them requiring re-intervention; death occurred in 4 patients (10.8%). Postoperative cancer staging revealed T2 in 10 patients, T3 in 18 and T4 in 9, lymphnodes metastasis in 11 with a mean harvested lymphnodes of 13,5.

**Conclusions/Discussion:** Laparoscopic colorectal surgery is feasible and effective for malignancies in very elderly patients, with acceptable morbidity and mortality and reduced bowel recovery and hospital stay. However, an experienced surgical and anesthesiology team is essential in reducing risks and complications.

**DEVELOPMENT OF AN AMERICAN COLLEGE OF SURGEONS NATIONAL SURGERY QUALITY IMPROVEMENT PROGRAM: ANASTOMOTIC LEAK RISK CALCULATOR FOR NON-EMERGENT COLECTOMY.**

P677

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**Purpose/Background:** Anastomotic leakage in colorectal surgery is a serious complication strongly associated with post-operative morbidity and mortality. Diversion can decrease anastomotic complications, but has its own risks. Prior studies have evaluated risk factors for anastomotic leak, but they have been limited by sample size and disease process. Recently released national data from NSQIP provides the most comprehensive database on colon anastomosis to date, allowing for better discrimination of risk factors, and determination of disease-specific risks. This study aims to provide validated decision tools used by surgeons to optimize operative planning and informed consent discussions with patients.

**Methods/Interventions:** A retrospective analysis was performed using data from the ACS NSQIP colectomy database between 2012 through 2015. Exclusion criteria were age < 18 years, ASA of 5 or none, emergent cases or unknown, or leak status unknown. Initial analysis and model building was limited to data from 2012 – 2014. Chi-squared, ANOVA or Welch's ANOVA were used where appropriate. Logistical regressions were used to build models to predict leak. Variables without significant odds ratios of leak or with more than 50% values missing were excluded. Models were evaluated using receiver operating characteristic (ROC) curves. Models were then validated on 2015 data. A p-value of 0.05 was used for all calculations.

**Results/Outcome(s):** 52,875 patients had an overall leak rate of 3.6%. This was significantly different based on operative approach but not significant different based on disease process. Over 30 significant risk factors were identified for anastomotic leak. Preoperative and intraoperative models were developed using the following variables: male sex, antibiotic bowel preparation, BMI, serum creatinine, hematocrit, white count, AST, ASA score, smoking status, chemotherapy, preoperative weight loss, intraoperative blood transfusion, operative time, pelvic anastomosis, open surgery, preoperative open wounds, and volvulus. The models were not significantly different, but the intraoperative model had the best fit (AUC = 0.653) compared to the preoperative model (AUC = 0.628). Both models performed significantly better than other predictors of morbidity, and when applied to 2015 data of 25,459 patients, there was no significant difference in performance (Preop AUC = 0.621, Intraop AUC = 0.651).

**Conclusions/Discussion:** Predictive models were developed that were subsequently validated against 2015 data.

Risk factors were identified that can be optimized prior to an elective colon anastomosis or used intraoperatively when considering diversion. Decision points were identified based on optimal sensitivity and specificity of ROC curves from pre-operative and intra-operative models. Both models can be used to improve decisions on when to consider diversion and aid in patient discussions.

**SYSTEMATIC IMPLEMENTATION OF A COLON BUNDLE SIGNIFICANTLY DECREASES SURGICAL SITE INFECTIONS.**

P678

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**Purpose/Background:** Surgical site infections (SSIs) represent significant morbidity and financial implications following colon surgery. The objective of this prospective study is to compare clinical outcomes pre- and post- implementation of a dedicated colon surgery bundle to reduce SSIs in our health system.

**Methods/Interventions:** A prospective study was conducted in which a dedicated colon surgery bundle and interdisciplinary team for its implementation was established. The twenty-five components of the colon surgery bundle were divided into pre-hospital, pre, intra, and post-operative measures. These included standardized pre-operative mechanical bowel preparation and oral antibiotics and body wash skin cleansing, alcohol-based skin preparation, intra- and peri-operative maintenance of normothermia, therapeutic levels of antimicrobial prophylaxis and optimal tissue oxygenation, glucose control, and the introduction of a clean standardized fascial closure process, and negative pressure wound therapy. Specific enhanced pre-operative patient education was also provided. Consecutive patients who underwent a colorectal procedure between January 2015 and January 2016 were included. SSIs were recorded and subdivided by surgical wound class.

**Results/Outcome(s):** SSIs were identified in 11/198 patients (7%) eligible for colon bundle implementation. When compared to the year prior to implementation of the colon bundle, SSIs were identified in 26/175 (15%). Implementation of the colon bundle led to a significant decrease in SSIs 7% vs. 15%, (p < 0.05). Additionally, the proportion of observed SSIs occurring in clean-contaminated and contaminated procedures decreased from 34.6% to 14.3% and 38.5% to 14.3%, respectively.

**Conclusions/Discussion:** We demonstrate in this prospective study that the implementation of a specific colon bundle resulted in a 54% decrease in post-operative SSIs. The greatest benefit was seen in wound classes II and III. We also show a very high adoption and compliance of



the colon bundle with a dedicated implementation of an interdisciplinary team. This approach to incorporating an advanced surgery bundle for colon and rectal procedures can provide an effective strategy to reduce SSIs.

#### PERIOPERATIVE AND EARLY ONCOLOGICAL OUTCOMES OF TOTAL PELVIC EXENTERATION WITHIN A CONTEMPORARY UK SERVICE.

P679

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**Purpose/Background:** International consensus recommendations for managing rectal cancer beyond total mesorectal excision planes advise specialised multi-disciplinary care alongside recommendations on diagnosis, treatment and follow-up. Prospective data collection on exenterative surgery in our unit was initiated in 2012. Total pelvic exenteration (TPE) is associated with significant morbidity. Complication rates of >80% and peri-operative mortality rates of 2-25% are reported. Our TPE service is fully collaborative, with dedicated multi-disciplinary meetings, clinics, and combined operating. We reviewed our TPE service with a focus on patients with rectal cancer.

**Methods/Interventions:** Consecutive patients undergoing TPE between March 2012 and April 2016 were included, enabling 6 months minimum follow-up. Pre-operative patient, tumour and treatment characteristics were recorded prospectively, in addition to records of progress and complications. Missing data and follow-up information were derived from electronic records. Active contact was made with clinic non-attenders to ensure accurate survival information. Data analysis was performed in StatsDirect.

**Results/Outcome(s):** 24 patients underwent TPE; 15 (62.5%) were male, with median (IQR) age 61 (55-72) years. 18 (75.0%) cases were performed for rectal cancer: 11 primary-advanced (PARC) and 7 recurrent (RRC) cancer. Management was concordant with most 'Beyond TME' recommendations with optimal use of high-resolution MRI (100%), staging CT (100%) and access to appropriate neo-adjuvant treatments (100%). In contrast, only 14 (58.3%) patients had pelvic imaging within the recommended 6 weeks of surgery. 9 patients (37.5%) had undergone previous surgery. These patients and those with RRC tended towards higher median blood loss, longer operating time, increased R1 resections and short-term mortality. There were no R2 resections throughout the cohort. Summarised demographics, peri- and post-operative outcomes, stratified by gender, tumour and surgery-type are recorded in Table 1. No small bowel anastomotic leaks occurred in the 23 patients who had ileal conduits. 2 (8.3%)

cases of anastomotic urine leaks were managed conservatively; 5 (20.8%) patients developed ileus requiring PN; 4 developed chest infections; 5 had wound infections requiring VAC therapy, and 3 suffered DVT. Over a median follow-up of 22 months, we recorded a 4.2% 30-day mortality, and 75.0% unadjusted 1-year survival.

**Conclusions/Discussion:** Early outcomes of our multi-disciplinary TPE service are promising, with good adherence to international recommendations. In this context, we report lower rates of anastomotic leak, and higher 1-year survival rates than most published series. Similar to other reported series, outcomes for patients undergoing primary surgery and those with PARC were favourable relative to re-do surgery or RRC. Limitations of this analysis include small numbers and partly retrospective data collection.

#### ENHANCED RECOVERY PROGRAM WITHOUT MECHANICAL BOWEL PREPARATION VS CONVENTIONAL RECOVERY IN COLORECTAL ANASTOMOSES WITHOUT STOMA: A PREMATURE TERMINATED RANDOMIZED CONTROLLED TRIAL.

P680

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**Purpose/Background:** Fast track surgery has become the standard in patients who underwent colorectal surgery, however the role of mechanical bowel preparation is still controversial. The purpose of this study was to evaluate the safety and benefits of an enhance recovery program without mechanical bowel preparation (MBP), compared to conventional recovery with MBP in patients with colorectal anastomosis without stoma.

**Methods/Interventions:** We prospectively included all patients with colorectal surgeries with primary anastomoses without stoma in a referral center in Mexico City. Patients were prospectively randomized in two groups (2:1): 1) Enhance recovery pathway without MBP, and 2) Conventional recovery with MBP. The initial sample size was calculated at 90. Comparisons between groups were performed using parametric and non-parametric methods.

**Results/Outcome(s):** 46 patients were included (31 vs 15 patients). All enhance recovery program items were covered in group 1. Anastomosis leaks and overall complications rates were higher in group 1 (20% vs. 0%, and 40% vs. 16%, respectively). The length of hospital stay was longer in group 1 (9 days vs. 6 days;  $p = 0.03$ ). Readmission rates were higher in group 1 (6.6% Vs. 0%). The ethics committee decided to prematurely conclude the protocol due to an over-expected morbidity rate.

**Conclusions/Discussion:** Enhance recovery pathway without MBP was associated with higher morbidity and anastomosis leak rates in colorectal anastomoses without stoma. Further studies are needed to validity of these results.

**THE COLORECTAL CANCER SAFETY NET: IS IT CATCHING PATIENTS APPROPRIATELY?**

P681

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**Purpose/Background:** Disparities in access to colorectal cancer care are multifaceted, and are influenced by socioeconomic factors. Uninsured and Medicaid patients are more likely to present with advanced stage disease and have worse outcomes compared to similar privately-insured and Medicare populations. Safety net hospitals (SNH) are institutions designated to provide care to vulnerable populations, including uninsured and Medicaid patients. Few studies have evaluated the effectiveness of SNHs compared to private institutions for colorectal cancer outcomes. Therefore, we aimed to compare demographics, stage at presentation and resection, and survival rates across insurance payers between a SNH and a tertiary care center (TCC) in the same metropolitan area. We hypothesized that outcomes in a SNH system, where all patients

theoretically have equal access to screening and cancer care, would be equivalent to those at a TCC.

**Methods/Interventions:** Patients were identified from the medical record and tumor registry using International Classification of Disease 9<sup>th</sup> revision diagnosis codes for colon and rectal cancers between 2010 and 2016 at a SNH and a TCC. Variables collected included demographics, socioeconomic data points, clinical and pathologic disease stage, and survival outcomes. The primary outcome was overall survival.

**Results/Outcome(s):** We identified 353 colorectal cancer patients from each hospital. Patients at TCC were significantly older than SNH patients (65.3 vs 60.7 years, p<0.001). SNH had a significantly higher proportion of uninsured and Medicaid patients than at TCC (46% vs. 14%, p<0.001), and the overall average median household income by zipcode was much lower at SNH than at TCC (\$39,299 vs. \$49,741, p<0.0001). On clinical staging at initial presentation, more patients at TCC presented with stage IV disease than at SNH (26% vs. 20%, p=0.06). On final pathologic staging, disease stage was similar between groups (p=0.08, Table 1). After a similar median follow-up period (28.7 months SNH vs. 30.4 months TCC, p=0.60), mean disease-free survival at SNH was 28.6±20 months vs. 27.8±19 months at the TCC (p=0.63). Overall survival was also similar at SNH to TCC (30.8±20 months vs. 30.8±19 months, p=0.99). When compared by stage, overall survival for stages 0 to III was similar at both hospitals, however, it was significantly shorter for stage IV

**P679 Table 1. Patient characteristics, peri-operative and early outcomes for TPE cases, stratified by gender, tumour and surgery type. (M=Median, R=Range)**

Group	n	Male (%)	Age	Operating	Estimated	% R0 Resections	Length	30-Day Mortality	1-Year Survival	Follow-up
			(years)	Time (mins)	Blood Loss (mls)		of Stay (days)			Duration (months)
			M (R)	M (R)	M (R)		M (R)			M
Male	15	100.0	69 (43-81)	660 (360-1470)	5000 (500-60000)	66.7	20 (13-96)	6.7	80.0	15
Female	9	0.0	61 (50-77)	680 (480-776)	2500 (1200-3400)	77.8	22 (13-135)	0.0	77.8	30
PARC	11	81.8	62 (50-81)	540 (360-760)	3000 (500-15000)	81.8	22 (18-35)	0.0	90.9	17
RRC	7	57.1	67 (51-73)	720 (480-1470)	4400 (2500-60000)	42.9	24 (13-96)	14.3	71.4	25
Other Ca	6	33.3	63 (43-69)	635 (285-776)	1100 (385-1500)	83.3	15 (14-37)	0.0	66.7	24.5
Primary Surgery	15	73.3	59 (43-81)	595 (285-776)	2500 (385-15000)	80.0	22 (14-43)	0.0	73.3	20.5
Re-do Surgery	9	44.4	70 (51-79)	720 (480-1470)	4200 (2500-60000)	55.6	20 (13-135)	6.3	77.8	25
Overall	24	62.5	61 (43-81)	640 (285-1470)	2500 (385-60000)	70.8	22 (13-135)	4.2	75.0	22

patients treated at the SNH (15.3±15 months vs. 23.5±4 months,  $p=0.02$ , Table 1).

**Conclusions/Discussion:** Despite insurance and income inequalities, SNH had lower rates of advanced disease at presentation, with similar final pathologic staging compared to TCC. Outcomes were similar for stages 0 to III disease at SNH and TCC, however, SNH patients with stage IV disease had significantly reduced overall survival. This suggests that, for most patients, SNHs can provide equivalent colorectal cancer outcomes despite socioeconomic inequalities.

### A MULTI-COUNTRY REAL-WORLD ASSESSMENT OF THE BURDEN OF STAPLE LINE INTERVENTIONS IN COLORECTAL ANASTOMOSES.

P682

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**Purpose/Background:** Anastomotic leaks are a serious complication of colorectal resections, and result in a significant clinical and economic burden. Intraoperative approaches to managing positive intraoperative leak tests vary greatly. This study aimed to understand the range and prevalence of interventions following positive intraoperative leak tests during colorectal resections performed with a circular stapler.

**Methods/Interventions:** In this retrospective cross-sectional study, electronic medical records (EMR) of patients with a positive leak test during a colon resection were reviewed. Surgeon information, patient demographics, comorbidities, surgical techniques, intraoperative interventions and post-operative outcomes were extracted from a minimum of 50 surgical EMRs per country for China, France, Germany, Italy, Japan, South Korea, United Kingdom, and United States. Statistics are reported as average  $\pm$  standard deviation.

**Results/Outcome(s):** Surgical EMRs for overall global sample of 458 patients with colon (66%) or rectal (34%) cancer were reviewed. 127 (28%) patients underwent laparoscopic left hemicolectomy, 107 (23%) laparoscopic sigmoidectomy, 47 (10%) open left hemicolectomy, 46 (10%) open sigmoidectomy and 131 (29%) anterior rectal resection. Average length of hospital stay was  $15.2 \pm 26.5$

days. Intraoperative leak testing was performed using the air leak test in 347 (76%) patients, methylene blue dye test in 103 (22%) patients and saline insufflation test in 8 (2%) patients. Notable variability was seen across the countries, with dye tests predominating in France and in Italy. Following a positive test, 355 (78%) patients underwent oversewing of the staple line (median 3 suture strands used), sealant was applied in 80 (17%) patients (median 2 sealant tubes used), and a new anastomosis was created in 43 (9%) patients (all with circular stapler). The average time required for the interventions was  $21.2 \pm 16.8$  minutes. A post-operative leak occurred in 62 (14%) patients. Furthermore, the occurrence of post-operative anastomotic leaks was also significantly influenced by the surgical approach, with more patients suffering from the complication following an open surgery (35.81%) compared to a laparoscopic surgery (57.64%).

**Conclusions/Discussion:** Management of intraoperative anastomotic leaks by oversewing the staple line or by applying a surgical sealant can be time, labor and cost-intensive. While the detection and management of intra-operative leaks did not appear to have a major impact on operative time. The additional days in hospital and the materials used for managing the intra-operative leak increase the cost of colorectal surgeries. Intra-operative interventions that reduce the incidence rate of intra- or post-operative leaks may help reduce the clinical burden on the patient as well as the economic burden on the health care system.

### RIGHT AND LEFT SIDED COLON CANCER SHOWS SIMILAR PROGNOSIS, EXPERIMENT IN SINGLE INSTITUTE.

P683

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**Purpose/Background:** Right and left sided colon cancer is a hot issue in recent years. For the different embryonic origin, researchers tried to discover its impact on the prognosis. However, different results were seen with many questions remains. Surveillance, Epidemiology, and End Results (SEER) database (2004-2012) showed better prognosis with right sided colon (Yahagi, M., et al. (2016). *J Gastrointest Surg* 20(3): 648-655.) but meta-analysis

**P681 Table 1. Distribution of pathologic disease stage by hospital and overall survival by stage.**

	Stage distribution			Overall survival		
	SNH, n(%)	TCC, n(%)	P-value	SNH, mean(SD)	TCC, mean(SD)	P-value
0/is	23(7.8)	27(7.9)	0.08 (overall)	39.7(21.4)	35.6(22.7)	0.5
I	65(22.1)	71(26.0)		30.9(19.6)	31.5(17.5)	0.9
II	83(28.2)	61(22.3)		32.4(20.3)	32.8(18.5)	0.9
III	93(31.6)	71(26.0)		31.9(19.7)	31.7(20.3)	0.9
IV	30(10.2)	43(15.8)		15.3(14.7)	23.5(13.9)	0.02

showed poor prognosis with right sided colon cancer (Warschkow, R., et al. (2016). *BMC Cancer* 16: 554.). Although the recruited number in both studies are large, the different answer cannot be beneficial to patients and clinicians. The difficulty to reach a standardized surgical procedure in meta-analysis or SEER data may be the cause of difference. Aiming to better understanding of location related prognosis changes, we try to retrospectively analysis the patients in our hospital to see if standardized operation may lead to different result.

**Methods/Interventions:** We retrospective review the medical record for stage I~III colon cancer patients receiving surgical intervention in our hospital. The data collection was from 1995 to 2013, and at least three year follow up of the disease status was acquired. Based on the surgical record and pathologic report, these patients were divided into right and left sided colon cancer. Right sided colon includes cecum, ascending colon, hepatic flexure colon and transverse colon. Left sided colon includes splenic flexure, descending colon, and sigmoid colon. The staging system is American Joint Committee on Cancer (AJCC) 7th edition. Overall survival and disease free survival after surgery were compared for each stage at both side. The survival analysis was carried on with Kaplan-Meier analysis.

**Results/Outcome(s):** Total 2179 right sided colon cancer and 3469 left sided colon cancer from 1995 to 2013 were recruited in the study. There is no significant difference seen with overall survival or disease free survival for stage I to III disease. Based on the AJCC 7th staging system, we divide the tumor stage more detailed and better prognosis was only seen with stage IIIb left sided colon cancer. Further study with a single surgeon's patient was done aiming to a more standardized surgical procedure. Total 413 right sided and 612 left sided cancer recruited. Better survival was seen with stage II right sided colon cancer for the single surgeon but no significant difference was seen if patients were grouped with more detailed stages.

**Conclusions/Discussion:** Although we retrospectively reviewed data from single institute, the recruited number was still more than 5000 and we believe it to be a convincing data. The result is compatible with the suspicion that there is no significant difference for tumor location on survival while meta-analysis and large databased showed different result. Appropriate surgical resection may result in similar prognosis of both sided colon cancer.

## DETERMINANTS OF DISCHARGE DESTINATION IN COLECTOMY PATIENTS.

P684

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**Purpose/Background:** Discharge to a postacute care (PAC) facility after surgery is associated with increased mortality, higher costs and is less desirable to patients than discharge to home. We sought to identify modifiable patient and care factors that may reduce rates of PAC discharge following colorectal resection.

**Methods/Interventions:** We conducted a retrospective cohort study of patients who underwent a colorectal resection between July 3, 2012 and June 1, 2015, using prospectively-collected data from the Michigan Surgical Quality Collaborative, a state-wide collaborative encompassing community, academic, and tertiary hospitals. Nurse-abstracted data from 60 participating hospitals included preoperative patient characteristics, postoperative course, and hospital factors. Hierarchical multinomial logistic regression was performed to identify factors associated with discharge destination.

**Results/Outcome(s):** Of 9,603 patients, 1,104 (11.5%) were discharged to a PAC facility, including subacute nursing facilities (SNF), long term acute care facilities (LTAC) and rehabilitation centers. Older age, female sex, and ASA greater than 3 were associated with PAC disposition ( $p < 0.001$ , SNF/LTAC OR 1.46; Rehab OR 5.19, SNF/LTAC OR 3.22, respectively). Functionally dependent patients were more often discharged to a PAC facility than to home, with SNF/LTAC more likely than rehab (SNF/LTAC OR 5.33, 95% CI 4.12–6.92; rehab OR 2.64, 95% CI 1.65–4.22). Patients who underwent urgent/emergent colectomy, had a contaminated/dirty wound, postoperative complication, or need for reoperation were more likely to be discharged to rehab or SNF/LTAC than to home (Rehab OR 4.47, SNF/LTAC 4.06; Rehab OR 1.63 SNF/LTAC 1.49; Rehab OR 4.20, SNF/LTAC OR 2.92; Rehab OR 2.70, SNF/LTAC OR 2.39, respectively). Several hospital characteristics were also associated with increased risk for PAC discharge, including smaller hospital size and fewer hospital resources (home health assistance, hospice care, inpatient palliative care, occupational health services, and pain management services). Academic affiliation was also associated with greater likelihood of discharge to rehab, but not to home or SNF/LTAC.

**Conclusions/Discussion:** Discharge to PAC facilities following colorectal resection is determined by a combination of patient factors such as preoperative functional dependence, a complicated perioperative course, and the type of hospital in which the patient received care. These

data suggest that preoperative patient optimization and increased availability of ancillary hospital resources may decrease need for PAC and increase likelihood of discharge to home.

### TRENDS AND OUTCOMES IN LAPAROSCOPIC VERSUS OPEN SURGERY FOR RECTAL CANCER BETWEEN 2005-2014 USING THE ACS-NSQIP DATABASE.

P685

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**Purpose/Background:** Since the early adoption of laparoscopy in the late 1980's, laparoscopy has been widely adopted in the surgical specialties and colorectal surgery for treatment of benign and malignant disease. However, controversy still exists regarding its role in the treatment of rectal cancer. Notably, a recent randomized controlled trial has failed to reject non-inferiority for laparoscopic surgery in the treatment of rectal cancer (ACOSOG Z6051). Despite this emerging data, the current practices for the treatment of rectal cancer across the country remain unknown.

**Methods/Interventions:** Using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database from 2005-2014, colorectal procedures were identified by CPT codes and categorized to open or laparoscopic surgery. Procedures without resection were discarded. Cases with primary diagnosis of rectal cancer, identified by ICD-9 code 154.1, were selected. The proportion of laparoscopic surgeries performed was determined for each year. Statistical analyses were performed by age, BMI, and ASA classification. Overall and yearly means and rates were then obtained for 16 outcomes measures. Statistical power was calculated for all outcomes given a two-tailed test with an alpha of 0.05 and a laparoscopic-to-open case ratio of 1:2.

**Results/Outcome(s):** A total of 21,312 resections were performed on rectal cancer patients; 7,090 (33.3%) performed laparoscopically. The use of laparoscopy increased yearly, from 11.0% in 2005 to 48.7% in 2014. Laparoscopic procedures were most commonly performed in the youngest age group (18-49 years), patients with BMI 18.5-29.9, and ASA Class 1-2 patients. Over the ten-year time period, there was a noted increase in the use of laparoscopy in every age, BMI, and ASA category, except ASA 5. All 30-day outcomes in the laparoscopic versus open groups tended to favor laparoscopy with the exception of operating room time (Table 1).

**Conclusions/Discussion:** These data suggest that minimally invasive surgery has been widely adopted for treating patients with rectal cancer, and perioperative outcomes tend to favor laparoscopic over open technique. Given findings in recent randomized controlled trials

rejecting non-inferiority of laparoscopy over open surgery for rectal cancer published in 2015, improved perioperative outcomes with minimally invasive technique could be a barrier for some surgeons to return to open technique. Limitations of the current study include possible unequal baseline characteristics of the patients, unequal training and capability of surgeons in the two study groups, and lack of long-term follow-up for oncologic outcomes. More studies are needed to further evaluate trends in the treatment of rectal cancer, particularly from 2016 onwards. Additionally, oncologic outcomes must also be considered when determining the best treatment options of patients with rectal cancer.

**Table 1: 30-Day Outcomes in Laparoscopic (Lap) versus Open Surgery Groups**

Outcome	Lap (95% CI) n=7,090	Open (95% CI) n=14,222
Death †	0.73% (0.55-0.96)	1.27% (1.09-1.46)
Cardiac Arrest Requiring CPR*	0.28% (0.17-0.44)	0.48% (0.37-0.61)
Cerebrovascular Accident	0.13% (0.06-0.24)	0.26% (0.18-0.36)
Myocardial Infarction	0.37% (0.24-0.54)	0.65% (0.52-0.79)
Pulmonary Embolism †	0.37% (0.24-0.54)	0.76% (0.52-0.79)
Deep Vein Thrombosis †	0.86% (0.66-1.10)	1.50% (1.30-1.71)
Pneumonia †	1.17% (0.93-1.45)	2.54% (2.29-2.81)
Ventilator >48 Hours †	0.90% (0.70-1.15)	1.95% (1.73-2.20)
Superficial SSI* †	4.81% (4.32-5.33)	9.77% (9.29-10.27)
Deep Incisional SSI †	1.62% (1.34-1.94)	2.62% (2.43-2.97)
Organ Space Infection	6.01% (5.47-6.59)	6.39% (5.99-6.81)
Renal Insufficiency	0.107% (0.85-1.07)	1.44% (1.25-1.65)
Acute Renal Failure	0.47% (0.32-0.65)	0.79% (0.66-0.95)
Urinary Tract Infection †	3.47% (3.06-3.92)	4.96% (4.61-5.33)
Operating Room Time (Minutes)†	270.1 (267.5-272.8)	243.5 (241.5-245.5)
Length of Hospital Stay (Days)†	6.9 (6.7-7.0)	9.2 (9.1-9.4)

\*CPR: Cardiopulmonary Resuscitation; SSI: Surgical Site Infection  
† Power > 85%

### RETROSPECTIVE REVIEW OF ANASTOMOTIC LEAKAGE FOLLOWING COLORECTAL SURGERY: 12-YEAR EXPERIENCE FROM THE LARGEST UNIVERSITY HOSPITAL IN THAILAND.

P686

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**Purpose/Background:** Anastomosis leakage (AL) in colorectal surgery is associated with high morbidity and mortality as well as permanent ostomy. This study aimed to determine incidence of AL, management and its outcome in a University hospital in Thailand.

**Methods/Interventions:** The authors retrospectively reviewed the medical records of patients with AL after colorectal surgery during 2004-2015 at the Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand. Data were recorded including patient's demographics, treatment and outcome.

**Results/Outcome(s):** AL occurred in 82 of 4357 patients (1.9%). AL was commonly diagnosed on postoperative day 3<sup>rd</sup> - 6<sup>th</sup>, and 12 out of 82 AL cases (14.6%) occurred after patients were discharged. Of all AL cases, 65 patients (79.3%) required surgery and 8 patients (9.8%) died. Twenty-five AL cases (30.5%) had permanent stoma. Sixty-two AL cases (75.6%) experienced some

complications after treating AL – mostly wound infection and intraabdominal collection. Average postoperative stay for AL cases was  $30.3 \pm 18.3$  days.

**Conclusions/Discussion:** Anastomosis leakage after colorectal surgery was associated with high morbidity and mortality as well as prolonged hospitalization. One-third of AL cases ended up with permanent stoma.

### DEFINING THE LEARNING CURVE FOR TRANSANAL TOTAL MESORECTAL EXCISION FOR RECTAL ADENOCARCINOMA: A CUSUM ANALYSIS.

P687

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**Purpose/Background:** Transanal total mesorectal excision (TA-TME) is a new approach advocated to improve rectal dissection for patients with low-lying rectal tumors or difficult pelvic anatomy. Early data supports its safety and feasibility, but it is technically challenging and the learning curve has not yet been determined. The objective of this study was to determine the number of TA-TME procedures for rectal adenocarcinoma required to reach proficiency.

**Methods/Interventions:** All TA-TME cases performed from 03/2012-07/2016 at a single high-volume tertiary care institution for rectal adenocarcinoma were identified from a prospective database. Four fellowship trained colorectal surgeons that were already proficient in laparoscopic TME and transanal procedures performed all TA-TME procedures. A cumulative summation (CUSUM) analysis was performed to determine the number of cases required to reach proficiency. The main proficiency outcome was high quality TME, defined by a complete or near-complete mesorectal envelope, negative distal (DRM) and circumferential resection (>1mm; CRM) margin. The acceptable and unacceptable rates of good quality TME were defined as proportion of high quality TME in laparoscopic (unacceptable rate = 81.7%) and open (acceptable rate = 86.9%) from the ACOSOG Z6051 trial.

**Results/Outcome(s):** A total of 68 consecutive cases were included with mean age 58.7yrs (SD10.0), BMI  $26.8\text{kg/m}^2$  (SD5.5), and 68% male. Mean height of tumor was 4.6cm (SD2.1) and 85% received neoadjuvant (chemo)radiation, with 21% of these patients demonstrating poor pathologic response. The preoperative CRM was involved in 28%. The abdominal dissection was performed laparoscopically in 78%, robotically in 16%, and by open surgery in 6%. A diverting loop ileostomy was fashioned in 97% of cases with primary anastomosis. The transanal dissection was performed first in 37% of cases, and a two-team approach performed in 37%. Postoperative morbidity occurred in 31% of patients, including 6%

anastomotic leak rate. Median length of stay was 5 days [IQR 3-10], including readmissions that occurred in 21%. A good quality TME was performed in 94% of cases consisting of a negative CRM in 97%, negative DRM in 99%, and complete or near complete mesorectal envelope in 99%. CUSUM analysis reported that the good quality TME rate improves after 36 cases and reaches an acceptable rate after 51 cases (Figure 1A). Mean operative time was 278min (SD83). Adjusted operative time plots also demonstrate improvement between the 36<sup>th</sup> and 51<sup>st</sup> cases (Figure 1B), adjusting for preoperative CRM involvement and tumor response to preoperative radiotherapy.

**Conclusions/Discussion:** TA-TME is a complex technique that requires a minimum of 37 to 51 cases to reach an acceptable incidence of high quality TME and lower operative duration. Careful adoption of this approach should include a structured and/or proctored training program.

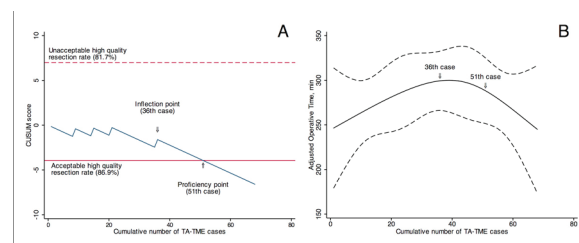


Figure 1: A) CUSUM analysis demonstrating proficiency at 51 TA-TME cases; and B) Adjusted operative time plot showing decline in mean operative duration between 37 and 51 cases

### ONCOLOGIC OUTCOMES OF LAPAROSCOPIC VERSUS OPEN RESECTION FOLLOWING STENT INSERTION FOR OBSTRUCTING COLON CANCER : MULTI-CENTER RETROSPECTIVE STUDY.

P688

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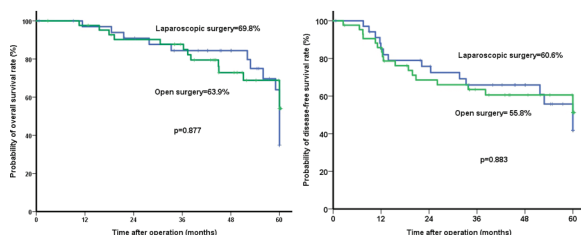
**Purpose/Background:** As a bridge to surgery, self-expanding metallic stents has the advantages of converting an emergency operation to an elective one and have been used for potentially resectable colorectal cancer. Multicenter prospective randomized trials have established that laparoscopic colectomy for curable colon cancer is not inferior to conventional open surgery and has favorable short-term outcomes. However, colonic obstruction has been considered to be a relative contraindication for laparoscopic surgery due to poor surgical field and potential hazard of injury to the fragile bowel and there are limited studies of the oncologic outcomes of stent-laparoscopy approach for obstructed colon cancer. The aim of our study was to discuss the safety and feasibility of laparoscopic resection following stent insertion and compare oncologic

outcomes between open and laparoscopic approach for obstructing colon cancer.

**Methods/Interventions:** The study group included 36 patients who underwent an open surgery and 44 patients who underwent a laparoscopic surgery for obstructing left-sided colon cancer at three tertiary referral hospitals between June 2005 and December 2013. All patients received surgical resection as a bridge to surgery.

**Results/Outcome(s):** The median follow-up period was 50 months in the open group and 47 months in the laparoscopic group. The median operation time, time to soft diet, and length of stay and were comparable between two groups. Four cases converted to open surgery (9.1 %) in laparoscopic group. The morbidity within 30 days after surgery were comparable between the two groups. The median number of harvested lymph nodes was significantly larger in the laparoscopic group than in the open group (37 vs. 20,  $p=0.007$ ). The proximal and distal resection margins, the histologic grade of tumor, TNM stage, median tumor size, and presence of lymphovascular invasion did not differ significantly between two groups. The 5-year overall survival rates of the open group and laparoscopic groups were 63.9% and 69.8%, respectively ( $p=0.877$ ), and the 5-year disease-free survival rates were 55.8% and 60.6% ( $p=0.883$ ), respectively. The recurrence pattern did not differ between groups.

**Conclusions/Discussion:** Laparoscopic resection following stent insertion for obstructing colon cancer can be performed safely, with long-term oncological outcomes comparable to those obtained with open surgery.



#### RISK ANALYSES OF ILEUS DURING HOSPITAL STAY FOR COLORECTAL CANCER SURGERY WITH SPECIAL ATTENTION TO RISK REDUCTION BY LAPAROSCOPIC APPROACH: A RETROSPECTIVE STUDY OF 2,148 CASES.

P689

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**Purpose/Background:** Ileus, one of the most popular complications after surgery for colorectal cancer (CRC), causes prolonged hospitalization period and increased medical costs. An increasing number of studies show that laparoscopic approach decreases the incidence of ileus in comparison with open approach, but the evidence levels

are insufficient. The aims of this study were to clarify the risk factors of ileus after surgery for CRC and to evaluate the impact of laparoscopic approach on risk reduction.

**Methods/Interventions:** A total of 2,148 cases who received curative resection for CRC between 1994 and 2011 were analyzed. In this study, we evaluated an early ileus developed during hospital stay for surgery, which require patients to delay in starting meals or to suspend oral intake. We investigated risk factors of ileus using a logistic regression model and the advantage of laparoscopic approach in risk reduction was examined using propensity score analysis to mitigate the selection bias. Covariates in models for propensity scores included sex, history of abdominal surgery, tumor depth ( $\leq T4a/T4b$ ), lymph node metastasis (negative/positive), and tumor site (colon/rectum).

**Results/Outcome(s):** The incidence of ileus was 6.7% (144/2148) in this cohort. Univariate analyses revealed that male sex ( $P = 0.0015$ ), open surgical approach ( $P = 0.024$ ), the presence of abdominal surgery history ( $P = 0.0063$ ) were significantly associated with the higher incidence of ileus. In multivariate analysis using these 3 parameters as variables, all these parameters were selected as independent risk factors for ileus; i.e., odds ratio (OR) of male sex, 1.95 ( $P = 0.0005$ ); OR of open surgical approach, 5.05 ( $P = 0.024$ ); and OR of abdominal surgery history, 1.73 ( $P = 0.0020$ ), respectively. In the propensity-matched cohort, patients treated by the laparoscopic approach showed a significant lower risk of ileus than those by the open approach (OR = 0.15,  $P = 0.014$ ).

**Conclusions/Discussion:** Our study showed that male, open laparotomy, and abdominal surgery history were all significant risk factors of ileus after CRC surgery. The superiority of the laparoscopic approach in terms of the risk reduction of ileus was indicated based on our propensity score analysis.

#### COMPARISON OF CONFLICT OF INTERESTS BETWEEN ROBOTIC AND NON ROBOTIC SURGERY STUDIES IN COLORECTAL SURGERY: A CASE-CONTROL STUDY.

P690

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**Purpose/Background:** Industry funding of research articles may potentially be associated with more favorable results and conclusions. As such, authors are required to declare any conflicts of interest which may bias the results. With the Physician Payments Sunshine Act, it is now possible to validate these declaration statements. The objective of this study was to assess the differences in declaration of conflicts of interest between robotic colorectal (Cases) and non robotic studies (Controls).

**Methods/Interventions:** All colorectal studies assessing robotic surgery published in 2015 were identified and reviewed. Non-robotic control articles, were selected from the same journal as the case article and matched based on study design. Using the “Open Payments” database, actual funding was determined for each American author, for 2013 and 2014. We then determined if there was a discrepancy between the author’s declared conflict of interest and the actual funding they received. Case articles and control articles were then compared for differences in declared conflict of interest, undeclared conflict of interest and the value of payments.

**Results/Outcome(s):** A total of 72 studies were included in our review (36 cases and 36 controls) and included 320 American authors (157 in the cases and 163 in the controls). Declaration statements were present in 53 studies (71.6%), with no difference between cases and controls (72.2% vs. 75.0%,  $P = 0.79$ ). Funding, as determined by the open payments database, was common across both cases and controls (82%), with case articles less likely to receive funding (69.4% vs. 94.4%,  $P = 0.006$ ). Undeclared funding was common in both groups (72% vs. 82%) and did not differ between case and control articles ( $P = 0.35$ ). The average funding was \$85,340 per study, with no difference between those that declared or did not declare their funding ( $P = 0.21$ ).

**Conclusions/Discussion:** We found that undeclared funding was common in both cases and control articles, with no significant differences between groups. Interpreting results from studies with undeclared funding and conflict of interest should be done with caution.

### IMPACT OF PREOPERATIVE CHEMORADIATION ON ONCOLOGIC OUTCOMES IN RECTAL CANCER WITH POSITIVE EXTRAMURAL VASCULAR INVASION.

P691

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**Purpose/Background:** Extramural venous invasion (EMVI) has become an independent risk factor in patient with rectal cancer. Recently, the preoperative MRI detection of EMVI has been practically established. Radiotherapy showed a significant role in downstaging and oncological outcome improvement in advance rectal cancer. Our aim in this study is to investigate the impact of preoperative radiotherapy in oncological outcome particularly for patient with EMVI and rectal cancer

**Methods/Interventions:** All rectal cancer patients have been selected on base of having histopathology positive EMVI post treatment (ypEMVI) and stage I-III at Yonsei University Health System from 2007 to 2013. Pre and post radiotherapy MRI of detecting EMVI were evaluated as mrEMVI and ymrEMVI respectively. Two groups of patients were allocated based on receiving preoperative long course radiotherapy or not. Mainly oncological outcome were compared between two groups by using all statistical analysis was carried out using IBM SPSS version 23 statistical package (SPSS Inc., Chicago, IL)

**Results/Outcome(s):** A total of 241 patients were included in this study underwent low anterior resection (LAR). The radiotherapy and non-radiotherapy group were 104 and 137 patients, respectively. There was no statistically difference between two groups in T stage, histological grade and circumferential resection margin involvement ( $p$ -value = 0.384, 0.878, 0.823 respectively). Positive mrEMVI between radiotherapy

**P689 Risk factors of the ileus after surgery for colorectal cancer**

Factors	Univariate analyses		Multivariate analysis	
	Odds ratio	P value	Odds ratio	P value
Sex (Male/Female)	1.83	0.0015	1.95	0.0005
Age	0.95	0.48		
Surgical approach (Open/Laparoscopy)	5.05	0.024	5.05	0.024
Tumor site (Rectum/Colon)	1.22	0.26		
Operation time	1.01	0.11		
Blood loss	1.00	0.13		
Dissection area of lymph nodes (D3/D1-2)	1.25	1.27		
Combined resection of other organs (Performed/Not-performed)	1.23	0.45		
Tumor depth (T4b/≤T4a)	1.15	0.68		
Lymph node metastasis (Positive/Negative)	0.71	0.06		
History of abdominal surgery (Presence/Absence)	1.62	0.0063	1.73	0.0020



and non-radiotherapy group were 32.7% and 7.3% respectively, (P-value=0.823). Among patient group who had radiotherapy, positive mrEMVI and ymrEMVI were shown 32.7% and 26% respectively. The oncological outcome between two groups showed no significant difference in cancer specific survival and overall survival, the P-value is 0.407 and 0.381, respectively

**Conclusions/Discussion:** The therapeutic effect of radiotherapy does not improve the oncological outcome in patient with EMVI. Accordingly, the indication of radiotherapy in patients with EMVI per se may not be beneficial

#### OPERATIVE SAFETY AND ONCOLOGICAL OUTCOMES IN RECTAL CANCER BASED ON LEVEL OF IMA LIGATION: STRATIFIED ANALYSIS OF A LARGE ASIAN COHORT.

P692

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**Purpose/Background:** The debate of level of inferior mesenteric artery (IMA) ligation, whether it is high or low ligation especially in rectal cancer, is a matter of concern. Many institutions have still practiced these types of technique despite the controversial benefit of proper level of IMA ligation in both short and long outcome. Our study aim is to stress more in this subject with large volume, only double stable anastomosis and combined both short and long outcome.

**Methods/Interventions:** A retrospective comparative study conducted at Yonsei University Health System from 2007 to 2013 between High and low ligation of IMA in rectal cancer that includes stage I-III, tumor location  $\geq 6$ cm, and double stapler end to end colorectal anastomosis. Perioperative and oncological outcome were compared between two groups by using all statistical analysis was carried out using IBM SPSS version 23 statistical package (SPSS Inc., Chicago, IL).

**Results/Outcome(s):** A total of 1213 patients included in this study, who underwent low anterior resection (LAR), high and low ligation groups were 835 and 378 patients, respectively. Perioperatively, there was no statistically significant different between two groups in anastomotic leak, blood loss, total No. of lymph node harvested and other complication rate (P-value = 0.85, 0.15, 0.37 and 0.22, respectively). Similarly, the oncological outcome showed no significant different in cancer specific survival and overall survival, the P-value is 0.08 and 0.21, respectively. Sub-analysis group of patients with anastomotic leak showed that there is no significant difference between high and low ligation in according to ASA stratification (P=0.77).

**Conclusions/Discussion:** Despite the evidence of decrease perfusion of the proximal limb after high ligation,

the benefit of low tie, in relation to perfusion of the anastomosis, has not been proven. Additionally, there is no significant difference based on oncological parameters and outcome.

#### BLEEDING COMPLICATIONS FROM DEEP VEIN THROMBOSIS PROPHYLAXIS IN THE POSTOPERATIVE COLORECTAL PATIENT: A RANDOMIZED PROSPECTIVE STUDY OF UNFRACTIONATED HEPARIN VERSUS LOW MOLECULAR WEIGHT HEPARIN.

P693

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**Purpose/Background:** Pharmacologic deep vein thrombosis (DVT) prophylaxis has become standard of care in the postoperative patient. Multiple studies have looked at the effectiveness of unfractionated heparin (UFH) and low molecular weight heparin (LMWH) as prophylaxis in preventing DVTs and pulmonary embolism (PE) showing a recent favoritism of LMWH. Postoperative bleeding complications such as gastrointestinal bleeding (GIB), presumably arising from suture or staple lines, can occur after colorectal surgery (CRS). Postoperative bleeding is sometimes minimal and insignificant, while other times require cessation of anticoagulation, transfusion, or other therapeutic measures. The aim of this study is to assess rates of postoperative bleeding complications after elective colorectal surgery with the use of different chemical DVT prophylaxis.

**Methods/Interventions:** After IRB approval, patients undergoing elective CRS were randomized preoperatively to either UFH or LMWH in the postoperative period. Patients were stratified first as "left" or "right" colectomy, with the line of demarcation being the splenic flexure, then randomized to UFH or LMWH. Exclusion criteria included prior VTE, clinical GI bleeding before surgery or use of anticoagulation in the preoperative period. A hemoglobin (Hgb) was checked prior to surgery and every morning postoperatively. Trends in Hgb were monitored. Primary outcomes included any signs of bleeding complications such as symptoms of GIB, hematoma formation, need for transfusion, or holding of anticoagulation.

**Results/Outcome(s):** As of the end of November 2016 there had been eleven patients recruited for the trial. Nine lefts, with five patients receiving UFH and four receiving LMWH, and two rights. Initially, both UFH and LMWH have both had incidence of GIB in the postoperative period as well as drops in Hgb, although the study is not yet powered to detect differences. There have been no documented incidences of DVT/PE. While these data represent only the initial study population, accrual will be

over 100 patients by June of 2017, which would provide a more ample study population.

**Conclusions/Discussion:** Recent literature has favored LMWH in the postoperative patient for the prevention of venous thromboembolism (VTE). A major concern of any surgeon is postoperative bleeding that becomes clinically significant. The need to transfuse cancer patients has been shown to have deleterious effects on survival, and holding anticoagulation in these patients postoperatively puts them at obvious risk for VTE. The goal of this prospective randomized trial is to provide data in an attempt to show which medication has a lower risk of postoperative GIB in the CRS patient. The authors hope that by providing this data healthcare providers can make a more informed decision when choosing an agent for DVT chemoprophylaxis.

### SINGLE INCISION LAPAROSCOPIC (SILS) RIGHT HEMICOLECTOMY: SINGLE AUSTRALIAN INSTITUTION EXPERIENCE OF 135 CASES.

P694

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**Purpose/Background:** Single-port laparoscopic colorectal surgery is a new technique. The aim of this study was to analyse the experience at a single Australian institution of the first 135 SILS-right hemicolectomies since its introduction. We propose that this approach is versatile and safe for minimally invasive right hemicolectomy.

**Methods/Interventions:** A retrospective analysis of prospectively collected data for all patients undergoing SILS-right hemicolectomy for both malignant and benign disease between February 2009 and December 2014 in a tertiary colorectal unit within a university teaching hospital. The patient demographics, clinical, operative and pathological factors were analysed.

**Results/Outcome(s):** One hundred and thirty five consecutive patients underwent SILS-right hemicolectomy during the period. Mean age was 64 years and 8 months, with 50.3% being females. Fifty four percent of patients had previous abdominal surgery, and median body mass index was 26 (range: 18 to 43). Fifty one percent of patients were overweight (BMI 25-30), 8.8% had class 1 obesity (BMI 31-35), 3.7% had class 2 obesity (BMI 36-40), and 2.2% had class 3 obesity (BMI 40+). The mean operating time was 112 minutes (range: 70 to 180 minutes). There was minimal intra-operative bleeding, with 93.3% having less than 100ml of reported blood loss. Median extraction wound size was 4.5cm (range: 3 to 6cm). There was no conversion to multi-port laparoscopy or open surgery. Sixty two percent of the operations were performed for carcinoma, of which 48.8% were stage T3 or T4. Median lymph node number was 18 (range: 3 to 62). The median length of hospital stay was 5 days (range: 3 to 46 days). There was

one mortality in this series from nosocomial pneumonia. There was 14.8% morbidity, including 3 (2.2%) patients requiring reoperation for anastomotic bleeding/leakage and wound infection in 5 patients (3.7%).

**Conclusions/Discussion:** This is currently the largest Australian series of single-incision laparoscopic right hemicolectomy. Despite the majority of our patients being overweight/obese, SILS was a versatile tool that did not require conversion to multiport laparoscopy nor open operation. In our experience, SILS has been a technique with acceptable morbidity and mortality, without compromising the conventional oncological parameters in minimally invasive colorectal surgery. Our findings support the use of SILS for right hemicolectomies.

### THE REAL BURDEN OF A DIVERTING ILEOSTOMY: WHAT ARE THE HIDDEN COSTS?

P695

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**Purpose/Background:** Diverting ileostomies are often created in both elective and emergency situations. However, complications arising from a stoma are not negligible. This study aims to compare the challenges arising from diverting ileostomies until its closure.

**Methods/Interventions:** A retrospective review of all patients who had a diverting ileostomy created at two independent healthcare institutions in Singapore was performed. Data variables were collected till the patients had their stoma reversed. All hospital admissions associated to stoma related complications were subsequently used to measure the burden of non-stoma closure.

**Results/Outcome(s):** Between January 2011 to June 2016, 193 patients, median age 65 (range: 22 – 94, years), had a diverting ileostomy created. The most common reason for its creation was following a low anterior resection (71%). Another 45 (23%) patients had theirs created in an emergency setting. Two thirds (67%) of the patients eventually had their ileostomy reversed, at a median duration of 7.3 (range: 1 – 35.5) months. In the reversal group, patients tend to be younger ( $p < 0.05$ ) and predominantly male ( $p = 0.046$ ). Those patients who had their diverting ileostomies reversed were 3 times more likely to have had the initial surgery performed in an elective setting (95% confidence interval (CI): 1.6 – 6.4). The most common stoma related complication that required hospital admission was dehydration secondary to high output stoma (73.3%). Stoma related complications were more seen in the non-reversal group compared to those who were reversed, though the difference was not statistically significant ( $p = 0.205$ ). Although the median cumulative length of stay for admissions related to stoma complications were similar (8 versus 7, days) ( $p = 0.659$ ), the number of hospital

admissions for the non-reversal group was almost double the reversal group (30 versus 18) ( $p$ : 0.001).

**Conclusions/Discussion:** A significant proportion of diverting ileostomies are not closed, and until its closure, stomal-related complications, especially from dehydration, is commonly experienced. Other hidden costs of ileostomies would include costs of stoma appliances and admissions related to stoma complications, regular stoma therapists consults and the impediment to the patient's quality of life.

#### CLOSURE OF INTESTINAL STOMA. THE EUROPEAN SOCIETY OF COLOPROCTOLOGY SNAPSHOT AUDIT STUDY.

P696

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**Purpose/Background:** Closure of interest in the stoma is a common surgical procedure, and there is paucity of data on the common practice and outcome of this procedure.

Multicenter cohort studies can record large number of patients in a short period of time, determine outcome rates, and suggest associations between practice variability and outcomes.

**Methods/Interventions:** A pan-European snapshot audit study was performed. Participating centers prospectively recorded all cases of adult patients (>18) undergoing closure of intestinal stoma over two months study period, with 30 days postoperative follow-up.

**Results/Outcome(s):** 2,284 patients in 303 sites in 48 countries where entered into the database. There were 945 females in 1339 males at to mean age of 58.6 years. There were 1688 ileostomies and 596 colostomies. 85% the stomas were created at the time of initial surgery, and 15% were performed subsequently for complications. In 64% of the cases, the stoma was created as a routine practice or owing to radiation therapy, and in 16% owing the patient's characteristics as malnutrition in steroid treatment. In 51%, the stoma was closed using a handsewn technique, and in 49% staplers were used. Intraoperative complications included enterotomy (2.5%), bleeding (1%), and other complications (2.6%). Radiologically confirmed anastomotic leak

P695 table

Characteristic	Stoma Reversed (n = 130)	No Stoma Reversal (n = 63)	p-value
Median Age, years (range)	64 (22 – 89)	68 (31 – 94)	0.05
Male Gender (%)	80 (61.5)	29 (46)	0.046
Type of Op (%)	.	.	
Elective	109 (83.8)	39 (61.9)	0.001
Emergency	21 (16.2)	24 (38.1)	
Reason for stoma creation (%)	.	.	
Anterior resections	103 (79.1)	34 (54)	
Anastomotic leaks	4 (3.1)	6 (9.5)	NA
Inflammatory bowel disease	3 (2.2)	3 (4.7)	
Intestinal obstruction (Extrinsic compression)	6 (4.5)	10 (15.9)	
Ischaemic bowel	7 (5.3)	5 (7.9)	
Perforated viscus	9 (6.7)	5 (7.9)	
Total number of admissions related to stoma complications	18	30	0.001
Median cumulative length of stay for admissions related to stoma complications, days (range)	7 (1-22)	8 (1-46)	0.659
Stoma complication rates (%)	17 (13.1)	13 (20.6)	0.205
Types of stoma complication (%)	.	.	
High output	12 (70.6)	10 (76.9)	
Bleeding	2 (11.7)	2 (15.4)	NA
Stoma leak	2 (11.7)	0 (0)	
Prolapse	1 (5.9)	1 (7.7)	

rate was 4.3%, and did not significantly differ between patients with handsewn anastomosis in patients with stapled technique (Figure 1). Wound infection occurred in 12% of the patients, readmission was required in 6.6%, and the reoperation in 5.4%. Multivariate analysis suggested that anastomotic technique did not affect anastomotic leak (CI: 0.79-1.91), abdominal abscess (CI: 0.95-1.87) and overall major complication rate (CI: 0.83-1.53).

**Conclusions/Discussion:** The results of this pan-European cohort study suggest that most of the stomas are created as part of the surgeons' routine practice. Approximately half are closed using handsewn and half by stapled technique. There is no significant difference anastomotic leak and major complications between these two techniques.

### PREDICTORS OF POOR OUTCOMES IN SMALL BOWEL DIVERTICULAR DISEASE.

P697

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**Purpose/Background:** Small bowel diverticulosis is a rare condition with clinical consequences that are likely underreported in the literature. Small bowel diverticular disease can lead to serious complications such as hemorrhage, perforation and obstruction that may require small bowel resection. Our objective was to study the risk factors for poor outcomes in the setting of small bowel diverticular disease.

**Methods/Interventions:** Utilizing the 2008-2012 National Inpatient Sample (NIS) database, we identified patients with small bowel diverticula using ICD-9-CM codes (562.00-562.03). Patients were then stratified into 2 groups based on whether or not small bowel resection was performed. The major outcomes that were studied were mortality, septic shock, and length of stay (LOS). Univariate and multivariate analyses were performed for the 3 major outcomes, while accounting for 17 different variables, and whether or not small bowel resection was performed.

**Results/Outcome(s):** A total of 19,172 patients were identified as having small bowel diverticulosis, of which 1,795 patients underwent surgical intervention with small bowel resection. Patients who had undergone small bowel resection were found to be significantly younger, non-smoking, healthier, and without the following comorbidities: chronic obstructive pulmonary disease (COPD), colonic diverticula, chronic kidney disease, hypertension, or diabetes. However, these patients also had more complications from their small bowel diverticular disease, including perforation and obstruction. Interestingly, the incidence of hemorrhage was not significantly different between the 2 groups. A summary of the univariate analysis can be found in Table 1. Multivariate analysis for in-hospital mortality

showed that undergoing small bowel resection was associated with a higher risk of death (aOR=2.29, p<0.001), compared with patients who did not undergo small bowel resection. Other factors that significantly increased the odds of mortality were advanced age (aOR=1.05, p<0.001), COPD (aOR=1.54, p=0.001), perforation (aOR=3.33, p<0.001), hemorrhage (aOR=2.49, p<0.001), and hypoalbuminemia (aOR=2.79, p<0.001). Risk factors for septic shock on multivariate analysis were small bowel resection (aOR=2.85, p<0.001), advanced age (aOR=1.02, p<0.001), COPD (aOR=1.39, p=0.017), small bowel perforation (aOR=3.74, p<0.001), hypoalbuminemia (aOR=2.10, p=0.026), and HIV-positive status (aOR=5.20, p=0.026). As expected, LOS was prolonged by 2 days (p<0.001) in patients who underwent small bowel resection based on the multivariate analysis.

**Conclusions/Discussion:** Based on the review of the NIS database, patients who underwent small bowel resection for small bowel diverticular disease had inferior outcomes when compared to those patients who did not need surgical intervention. Patients with advanced age, COPD, perforation, hemorrhage, and hypoalbuminemia were at risk for having poor outcomes in the setting of small bowel diverticular disease.

### SURGEON AND HOSPITAL VARIATION IN ANASTOMOTIC LEAK AFTER COLORECTAL RESECTION.

P698

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**Purpose/Background:** Anastomotic leak remains a significant source for morbidity and mortality following colorectal resections. Leak rates may be influenced by patient, surgeon and hospital-level factors. Until now, a multi-institutional data source with accurate leak data was unavailable, particularly one with hospital- and surgeon-specific information. Our objective was to assess the variability in risk-adjusted, clinically-significant anastomotic leak at both the hospital and surgeon levels after colon or rectal resections.

**Methods/Interventions:** Operations from 2014-2015 in the American College of Surgeons' National Surgical Quality Improvement Program (ACS NSQIP) Procedure Targeted Colectomy and Proctectomy datasets were included for analysis, excluding cases with diverting or end ostomies. Clinically-significant anastomotic leaks were defined as those requiring treatment (i.e., reoperation, drainage or antibiotics). A mixed-effects model was constructed to assess clinically-significant anastomotic leak events and evaluate the between-hospital and between-surgeon variability in leak rates, while adjusting for patient characteristics (e.g., sex, ASA class, smoking status) and case-specific factors (e.g., specific CPT code,

operative approach, use of bowel preparation, tumor stage). Intra-class correlation coefficient was used to estimate reliability, and a volume threshold consistent with reliability of 0.4 was established as 15 cases for surgeon-specific analysis.

**Results/Outcome(s):** There were 43,543 colorectal resections performed by 2,985 surgeons across 223 hospitals. The overall rate of clinically-significant anastomotic leak following colorectal resection was 3.1% (n=1347). The average risk-adjusted anastomotic leak rate per hospital ranged from 2.2% to 5.7%. There were 2 outlier hospitals with risk-adjusted anastomotic leak rates higher than expected. For 813 surgeons with 15 or more cases, the average risk-adjusted leak rate per surgeon ranged from 1.9% to 6.2%. Hospital-level characteristics accounted for only 1.9% of the variation in leak rates (95% CI 0.4-3.4) while surgeon-level characteristics accounted for 4.3% (95% CI 1.2-7.5).

**Conclusions/Discussion:** Risk-adjusted, clinically-significant anastomotic leak rates after colorectal resection vary 2.5-fold between the best and worst performing hospitals and 3-fold among surgeons. However, the variability in leak rates attributable to the hospital or surgeon appears minimal. Improvement in anastomotic leak requires clinicians and researchers alike to refocus on patient-level risk factors and interventions.

## A PILOT STUDY TO REDUCE LENGTH OF STAY IN COLORECTAL SURGERY PATIENTS THAT LIVE IN REMOTE LOCATIONS.

P699

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**Purpose/Background:** Tertiary referral centers draw patients from a large catchment area, some of which travel a great distance for treatment. Discharging a patient home to a remote location is concerning because they cannot easily reach medical care should they have a post discharge complication. For this reason, these patients are often observed in the hospital, even after achieving discharge criteria increasing their length of stay (LOS). In 2013, a pilot program was introduced for early discharge of these patients to a hotel within 1 mile of the medical center where they can be monitored and easily returned to clinic if they exhibit symptoms of concern. The aim of this study is to assess the safety and success of this program based on morbidity, readmissions and LOS.

**Methods/Interventions:** All consecutive patients undergoing elective colon and rectal resection of a single surgeon at a single tertiary care center from 2013 to 2016 were included. Patients selected for the program (group A) had to live at least 50 miles from the medical center and meet discharge criteria (pain controlled, tolerating a diet, consistent bowel function). Group A was compared to the remaining patients who were discharged home (group B). Patient demographics, preoperative characteristics, morbidity and mortality of the two groups were compared

**P697 Table 1. Univariate analysis of SBD patient separated by the status of SBR. For brevity, insignificant characteristics (hemorrhage, hypoalbuminemia, HIV, immunosuppression, and diabetes with renal manifestations) are omitted.**

	No SBR	SBR	P-value
No. of Patients with SBD	17,377	1,795	
Age (mean ± SD)	72 ± 15	69 ± 16	<0.001
Sex (% female)	58.78%	49.86%	<0.001
Small bowel diverticulitis	1,667 (9.59%)	736 (41.00%)	<0.001
COPD	3,252 (18.71%)	273 (15.21%)	<0.001
Perforation	96 (0.55%)	138 (7.69%)	<0.001
Obstruction	538 (3.10%)	270 (15.04%)	<0.001
Colon Diverticula	2,422 (13.94%)	188 (10.47%)	<0.001
Smoking	1,969 (11.33%)	168 (9.36%)	0.012
Chronic Kidney Disease	1,972 (11.35%)	138 (7.69%)	<0.001
Hypertension	9,060 (52.14%)	852 (47.47%)	<0.001
with Chronic Kidney Disease	1,726 (9.93%)	125 (6.96%)	<0.001
Diabetes	3,693 (21.25%)	326 (18.16%)	0.002
In-hospital mortality	271 (1.56%)	72 (4.02%)	<0.001
Septic shock	231 (1.33%)	83 (4.62%)	<0.001
Median length of stay in days (IQR)	5 (3-7)	8 (5-11)	<0.001

using chi-square analysis and student's T test. Patients with in hospital complications and a LOS greater than 7 days were excluded to eliminate outliers in group B.

**Results/Outcome(s):** A total of 230 patients were included with 61 in group A and 169 in group B. The two groups did not differ significantly by age ( $52.6 \pm 15$  vs  $55.5 \pm 16$ ,  $p=0.228$ ), gender (49.2% vs 42.6% male,  $p=0.375$ ), diagnosis (41% vs 46.7% benign,  $p=0.404$ ), procedure (88.5% vs 89.9% segmental colectomy,  $p=0.451$ ), approach (75.4% vs 63.3% laparoscopic,  $p=0.086$ ), steroid use (21.3% vs 18.9%,  $p=0.688$ ), BMI ( $28 \pm 6.1$  vs  $28.5 \pm 6.6$ ,  $p=0.651$ ), preoperative weight loss (3.3% vs 10.1%,  $p=0.099$ ) or ASA class. Average LOS was less for group A ( $3.25 \pm 1.4$  vs  $4.25 \pm 1.5$  days,  $p=0.001$ ). A trend toward decreased morbidity in group A was present but did not reach significance (1.6% vs 8.9%,  $p=0.057$ ). No mortalities were observed in either group. 30-day readmission rates were comparable between the two groups (6.6% vs 8.3%,  $p=0.667$ ).

**Conclusions/Discussion:** This study shows that for this selected patient population, early discharge to a local hotel is safe without incurring increased risk. The two groups did not differ on demographics, preoperative characteristics, morbidity or mortality however, group A had a significantly shorter LOS by 1 day. This program allows for close observation without continued admission to the hospital and will have significant cost benefit for the hospital with increased bed availability for incoming patients.

#### A LOW COST AND SIMPLE NEGATIVE PRESSURE COMPRESSION DRESSING REDUCES SURGICAL SITE INFECTION RATE OF PRIMARILY CLOSED ILEOSTOMY AND COLOSTOMY REVERSAL WOUND.

P700

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**Purpose/Background:** Surgical site infection (SSI) rates following primary closure of ileostomy or colostomy (collectively termed "ostomy") reversal wounds are reported to be as high as 40%. For this reason, most ostomy closure wounds are left either partially or completely open. This results in increased morbidity associated with wound care and delayed healing time. Negative pressure compression wound dressing has been used prophylactically in high risk wounds to reduce surgical site infections. We hypothesized that a low cost and simple compression dressing can significantly reduce surgical site infection in primarily closed ostomy wounds. **PURPOSE:** Our goal is to study the impact of using a novel negative pressure compression dressing in reducing SSI rates in patients undergoing primary closure of ileostomy and colostomy wound.

**Methods/Interventions:** Eighteen consecutive ileostomy and colostomy closure patients were selected. After closing the abdominal fascia, the wound was irrigated with dilute betadine solution. The skin incision was completely closed in running subcuticular fashion. Two layers of double-folded 4x4 gauze were placed over the wound and topped with 10 x 12 cm Tegaderm<sup>TM</sup>. A hypodermic needle connected to a syringe was used to suction out air from under dressing. The dressing was maintained in place, undisturbed, until its removal at 48 hours postoperatively. The CDC definition of surgical site infection was used in evaluation of the wound. This was a single institution pilot study in which negative pressure wound therapy (NPWT) was applied intra-operatively to ostomy closure wounds. Assuming a historical control of 40% SSI in primary wound

**P699 Patient Demographics, Operative Characteristics and Outcomes**

	Group A	Group B	P value
N	61	169	
Age (years)	52.6 +/- 15	55.5 +/- 16	0.228
Male	49.2%	42.6%	0.375
Benign	41%	46.7%	0.404
Steroid Use	21.3%	18.9%	0.688
BMI	28 + 6.1	28.5 + 6.6	0.651
Segmental Colectomy	88.5%	89.9%	0.451
Laparoscopic	75.4%	63.3%	0.086
Preoperative Weight Loss >10%	3.3%	10.1%	0.099
Overall Morbidity	1.6%	8.9%	0.057
30 day Readmission	6.6%	8.3%	0.667
LOS (days)	3.25 +/- 1.4	4.25 +/- 1.5	0.001

closure, we wished to achieve a reduction in SSI to 5% (87.5 % reduction) in the study group, with application of this dressing. Alpha of 0.05 and beta of 0.8 were used to obtain a target sample size 16.

**Results/Outcome(s):** Of eighteen study patients, none developed SSI postoperatively. All patients had initial follow up visits between 21 to 28 days postoperatively. Patient were subsequently followed for 3 months postoperatively. Median follow up time: 61 days. Mean: 62 days. Range: 30-92 days.

**Conclusions/Discussion:** The use of a low cost negative pressure compressing dressing significantly reduced SSI in patients undergoing primary closure of ostomy wound compared to historical control. Based on the success of our preliminary results, further randomized studies are needed to demonstrate its efficacy.

#### ADHERENCE TO SURVEILLANCE GUIDELINES FOLLOWING COLONIC POLYPECTOMY IS ABYSMAL.

P701

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**Purpose/Background:** Surveillance guidelines following excision of colonic tubular adenomas are well established. However, adherence to the guidelines are not always practised. The aim of our study was to evaluate the rate of compliance to the recommended guidelines following polyp removal.

**Methods/Interventions:** A review of a prospectively collected colonoscopy database in a single tertiary institution was conducted for all patients who underwent polypectomy in 2008. We excluded patients who were diagnosed with or had prior history of colorectal malignancy. The frequency of subsequent colonoscopic evaluation performed for these patients were evaluated against the recommended guidelines based on the histology of the removed polyps to evaluate compliance.

**Results/Outcome(s):** There were 447 colonoscopies with polypectomies were performed in 2008, in a patient cohort of median age 60 years (26 – 95), with the most common diagnosis being tubular adenoma with low grade dysplasia (n= 292, 65.2%). Adherence to post-polypectomy surveillance guidelines based on the factors such as the characteristics of the colonic polyps, bowel preparation at initial colonoscopy was only 13.6% (n=61). There were 26.4% (n=118) of patients who had surveillance endoscopy earlier than recommended and none of them were diagnosed with malignancy. The majority of patients had surveillance scopes later than recommended or were lost to follow-up (n=203, 45.4%), of these patients, 2 patients were found to have malignancy subsequently 3 years and 5 years after their recommended surveillance scope date respectively.

**Conclusions/Discussion:** There is a fairly low compliance to post-polypectomy surveillance guidelines, although the incidence of delayed colorectal cancer remains low. More needs to be done to improve compliance to guidelines amongst both patients and clinicians.

#### READMISSION RATES AND ACUTE KIDNEY INJURY AFTER DEFUNCTIONING ILEOSTOMY: CAN WE DO BETTER?

P702

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**Purpose/Background:** Formation of defunctioning loop ileostomy after anterior resection for colorectal cancer is a standard practice. Reversal of ileostomy is usually planned on completion of adjuvant therapy and preferably before 18 months from initial resection. Patients with an ileostomy are at risk of problems with high output stoma and dehydration which often requires admission to hospital and parenteral fluid therapy. This study aimed to the incidence of acute kidney injury (AKI), readmissions rates and closure of stoma in patients following a defunctioning ileostomy.

**Methods/Interventions:** A retrospective analysis of consecutive patients whom underwent elective anterior resection with defunctioning ileostomy for colorectal carcinomas between January 2008 and December 2012 at the University Hospitals of Leicester. Primary endpoints analysed were: readmission rates, number of acute kidney injury episodes and ileostomy closure rates.

**Results/Outcome(s):** 283 patients were identified whom underwent elective anterior resection with defunctioning ileostomy. Of these patients 208 patients had laboratory results available pre and post-operative: 126 were males and 82 were females. The median age was 66.3 (Range: 28-85). Ileostomies were closed in 162 of those patients (77.9%) with an average of 273.7 days between initial surgery and closure (Range: 54-724). 47.7% patients were readmitted between initial colorectal surgery and closure of ileostomy, 28 patients had more than 5 admissions (9.9%), 30.4% of the patients were readmitted with ileostomy related complications. AKI occurred in 51 (24.5%) patients (Stage 1 – 36, Stage 2 – 6, Stage 3 - 9) following surgery. The incidence of acute kidney injury was more prevalent amongst males (60.8%). The median pre-operative eGFR was 85.5 (Range: 7 - >90) whilst the median immediate post-operative eGFR was 84 (Range: 7 - >90) whilst the median post-operative eGFR in the 10 days following surgery was 80.4 (Range: 8.5 - >90). The median pre-operative serum albumin level was 44 (Range: 32-58) whilst the median minimum post-operative albumin level in the 10 days following surgery was 31 (Range: 7-42). This is an average median

decrease by 30.4% (Range: 4.5-83.3%) in serum albumin levels in the 10 days following surgery.

**Conclusions/Discussion:** There is a high readmission rate following defunctioning ileostomy due to AKI and justify developing interventions to reduce admissions due to dehydration from high stoma output by a combination of patient education, community interventions, use of antimotility agents and closure of ileostomy at the earliest opportunity.

### DOES A HIGH PREOPERATIVE NEUTROPHIL LYMPHOCYTE RATIO PREDICT A LONGER POSTOPERATIVE INPATIENT STAY FOR PATIENTS UNDERGOING COLORECTAL SURGERY?

P703

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**Purpose/Background:** Colorectal cancer is the third most common cancer in the United Kingdom. It accounts for approximately 42000 new cases every year. Neutrophil lymphocyte ratio is an easily measured parameter from the patients routine blood count. It has been proven in previous studies that an elevated pre operative neutrophil lymphocyte ratio (NLR) is associated with poorer outcomes in colorectal cancer patients. Our hospital is a small district general hospital with a well established colorectal department. Laparoscopic colorectal surgery is routinely employed for our patients. Peri operative care of the patients is carried out according to an established enhanced recovery protocol.. This is co-ordinated by a multi disciplinary team consisting of surgeons, specialist nurses, physiotherapists and anaesthetists The aim of this study was to find out whether an elevated preoperative neutrophil lymphocyte ratio (NLR) predicts longer post operative hospital stay in patients undergoing colorectal surgery.

**Methods/Interventions:** A retrospective cohort study was carried out on patients who underwent colorectal surgery at our district general hospital over a period of nearly 5 years (January 2012 to August 2016). The most recent blood investigations of the patient before surgery were searched and the NLR was deduced from the complete blood count. Patients with a pre-operative NLR > 5 were categorised as high and those with NLR ≤ 5 were categorised as low NLR. The data was collected on demographics, day of removal of urinary catheter post operatively, bowels opened, independent mobility, length of stay and readmittance percentage.

**Results/Outcome(s):** A total of 221 patients were included in the analysis. 180 patients had a low NLR (≤ 5) and 41 patients had a high NLR (>5). The mean hospital stay for patients with a low NLR was 7 and patients with a high NLR was 9 days. Patients stayed in on an average

2 days longer when they had a high pre-operative NLR. The number of readmissions were also higher in patients with a high NLR (7.5%) compared to patients with a low NLR (4.42%). The outcomes are outlined in more detail in the attached table.

**Conclusions/Discussion:** Our study shows that patients undergoing colorectal surgery with a high pre operative NLR (>5) have a more prolonged post operative hospital stay compared to patients with a low pre operative NLR (≤ 5). The readmittance rate in these patients is also higher after discharge. Previous studies have shown that an elevated NLR is associated with poorer cancer specific outcomes like overall survival and morbidity in patients undergoing colorectal surgery. Our study shows that this is also associated with a longer post operative hospital stay. This knowledge could be used to have a more informed discussion of prognosis and outcomes with patients undergoing colorectal surgery.

### INTERVENTIONS REDUCE DEHYDRATION RELATED TO DEFUNCTIONING LOOP-ILEOSTOMY: A PROSPECTIVE COHORT STUDY.

P704

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**Purpose/Background:** Defunctioning loop ileostomy (DLI) in low anterior resection (LAR) in rectal cancer patients reduces the morbidity of anastomotic leakages. According to a previous study 30% of these patients developed dehydration, of which half needed hospitalisation, the majority during the first six weeks. The aim of the present interventional study was to reduce these figures by a surveillance program.

**Methods/Interventions:** Prospective study of rectal cancer patients operated with LAR and DLI at two teaching hospitals during 2013-2015. All patients received written and oral information on and measures to undertake in case of high stoma output Blood tests including creatinine and electrolytes were done every second week until eight weeks postoperatively. Patients were also encouraged to weigh themselves if two consecutive days with high stoma output.

**Results/Outcome(s):** Preliminary results show that one hundred and twentythree patients were included, aged 62±8.4 years (mean) of which 52 females and 71 males). Mean ASA was 1.8, BMI was 26 ±5.3 and 58% received neoadjuvant treatment. Nineteen (15%) patients developed dehydration during follow up of which only eight (7%) needed hospitalization.

**Conclusions/Discussion:** Preliminary results indicate that surveillance significantly reduces dehydration resulting in fewer readmissions. However, patients with



renal impairment are at risk and should be followed cautiously.

#### PATIENTS NEED TO KNOW THAT ILEOSTOMY FOLLOWING ANTERIOR RESECTION MAY NOT BE REVERSED.

P705

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**Purpose/Background:** Diverting ileostomies are often created following low colorectal anastomosis to reduce the clinical consequences of an anastomotic leak. Whilst many patients are advised that these ileostomies are temporary, it may not often be the case. The purpose of this study was to look at the actual reversal rates of diverting ileostomy following anterior resections and the reasons for delayed or non-reversal.

**Methods/Interventions:** A retrospective review of data was performed. Patients who underwent anterior resection with a diverting ileostomy within the study period (Mar 2011 to Mar 2013) formed the study group. They were then followed up for at least 3 years to identify the real ileostomy reversal rates.

**Results/Outcome(s):** A total of 115 patients had a diverting ileostomy following anterior resection within the study period. Seventy-six (66.1%) patients had a reversal before Mar 2016. The median time to reversal was 8 months (1-26 months) with 13% reversed within 12 weeks. Two patients (2.6%) had anastomotic leaks post ileostomy reversal requiring surgery and 1 patient (1.3%) had significant per rectal bleeding requiring hospitalization. Worsening or new onset comorbidities represented the most common reason for non-reversal of ileostomies (12 out of 39 patients, 30.8%). This was followed by

disease progression (9 out of 39 patients, 23.1%) and patient choice (8 out of 39 patients, 20.5%).

**Conclusions/Discussion:** One in 3 diverting ileostomies performed following anterior resection is not reversed. The interval time to its closure is often longer than typically expected. Patients should be made aware of the significant possibility of non-reversal.

#### OUTCOMES OF OMENTAL PEDICLE FLAPS IN ELECTIVE COLORECTAL RESECTIONS.

P706

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**Purpose/Background: Introduction** Omental pedicle flaps are often fashioned at the time of intra-abdominal colorectal procedures to exclude the pelvis from small bowel or to protect at-risk anastomoses. However, convincing data for their routine use is lacking. **Objective:** To evaluate the short-term outcomes of patients in whom omental pedicle flaps were created during elective colorectal surgery.

**Methods/Interventions: Design:** Retrospective cohort review **Setting:** Academic tertiary care center **Participants:** Adult patients undergoing elective left-sided colectomy or proctectomy at a single center from January 2011 through December 2015 were included. Patients with omental pedicle flaps created during the procedure were compared to those without flap creation for demographics, co-morbidities, diagnosis, surgery and operative approach. The primary outcomes were 30-day postoperative complications and length of stay.

**Results/Outcome(s):** 732 patients undergoing elective left sided resections were included. 349 patients (47.7%) had an omental pedicle flap created and 383 (52.3%)

#### P703 RESULTS

	LOW NLR RATIO ( $\leq 5$ )	HIGH NLR RATIO ( $>5$ )
PRE-OP HAEMOGLOBIN (MEDIAN) (gm/lt)	127	120
PRE-OP WHITE BLOOD CELL (MEDIAN)	7.3	9.3
PRE-OPERATIVE NEUTROPHIL (MEDIAN)	4.6	7.2
PRE-OP LYMPHOCYTES (MEDIAN)	1.7	1
PRE-OP NEUTROPHIL / LYMPHOCYTE RATIO (MEDIAN)	2.7	6.2
CATHETER REMOVAL (MEAN) DAYS	2	2
RE-CATHETERISED (PERCENTAGE)	1.66%	7.50%
INTRAVENOUS FLUIDS STOPPED (MEAN) DAYS	1	1
INDEPENDENTLY MOBILE (MEAN) DAYS	2	2
BOWELS OPENED (MEAN) DAYS	4	3
LENGTH OF STAY (MEAN) DAYS	7	9
READMITTANCE (PERCENTAGE)	4.42%	7.5%
NUMBER OF PATIENTS	181	40

did not. There were no significant differences between the patient groups in terms of demographics, although a greater proportion of the patients without a flap were obese and underwent open surgery. Creation of an omental pedicle flap was associated with a significantly decreased rate of anastomotic leak (0.6% vs 2.9%,  $p=0.02$ ) and shorter length of hospital stay (5.2 vs 6.6 days,  $p=0.002$ ). A subgroup analysis of patients undergoing laparoscopic surgery revealed that omental pedicle flap was associated with reduced septic complications ( $p=0.03$ ) and shorter hospital stay ( $p=0.002$ ). Stratified by BMI, omental pedicle flaps were associated with a reduction in anastomotic leak ( $p=0.02$ ) and duration of hospital stay ( $p=0.047$ ) in underweight patients ( $BMI \leq 25 \text{ kg/m}^2$ ). In patients with  $BMI > 25 \text{ kg/m}^2$ , omental flaps were associated with a reduction in perineal wound complications ( $p=0.02$ ), duration of hospital stay ( $p=0.02$ ) and bowel obstructions ( $p=0.05$ ). Logistic regression analysis suggested that anastomotic leak was less likely in the omental flap group OR: 5.201, CI: (1.10-24.59).

**Conclusions/Discussion:** Omental pedicle flaps are associated with a significantly decreased rate of anastomotic leak and shorter duration of hospitalization, without an increase in other complications. Creation of omental pedicle flaps should be considered to improve short-term outcomes after elective left sided colorectal resections.

**Methods/Interventions:** All patients who had loop ileostomy and ileostomy closure between 2012 and 2015 were identified from an IRB-approved, prospectively maintained institutional database. The patients who underwent ileostomy closure (<3 months) were compared against matched patients undergoing ileostomy closure ( $\geq 3$  months). The outcomes for the two groups were compared.

**Results/Outcome(s):** A total of 358 patients were analyzed. Mean age was  $46 \pm 17$  years. There were 179 patients in each group [ileostomy closure (<3 months) and ileostomy closure ( $\geq 3$  months)]. Both groups were matched. Groups were comparable in preoperative characteristics and demographics. All of the peri-operative variables were comparable. No difference was observed in estimated blood loss (EBL), operative time (OT) and length of stay (LOS) (all  $p > 0.05$ ). Postoperative outcomes including wound infection, post-operative bleeding, intra-abdominal abscess, ileus, small bowel obstruction (SBO), anastomotic leak, reoperation, surgery related readmission, postoperative transfusion were also similar among the groups ( $p > 0.05$ ).

**Conclusions/Discussion:** Ileostomy closure (<3 months) is practical and safe. It does not increase morbidity and significantly reduces the time patient has a stoma. This may be advantageous in regards to having a reduced possibility of stoma related complications.

#### DOES THE TIMING OF LOOP ILEOSTOMY CLOSURE AFFECT OUTCOME: A CASE-MATCHED STUDY.

P707

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**Purpose/Background:** The optimal timing for the closure of loop ileostomies after index operations remains controversial. The aim of this study is to determine whether ileostomy closure (< 3 months post formation) affects stoma-related morbidity compared to late closure ( $\geq 3$  months post formation).

#### P706

Variable	Omental flap N= 349	No omental flap N= 383	p-value
Anastomotic leak	2 (0.6%)	11 (2.9%)	0.02
Abdominal or pelvic abscess	11 (3.2%)	19 (5.1%)	0.2
Hospital stay (mean/day)	5.2 (3.4)	6.6 (7.6)	0.002
Variable	Odds Ratio (OR)	Confidence interval (CI)	p-value
BMI (underweight/normal vs. overweight/obese)	2.371	0.744 – 7.553	0.144
Diagnosis (Benign vs. malignant disease)	0.547	0.164 – 1.824	0.326
Wound class (I-II vs. III-IV)	0.700	0.206 – 2.371	0.566
Approach (open vs. laparoscopy)	0.784	0.195 – 3.151	0.732
No omental flap vs. omental flap	5.201	1.100 – 24.594	0.038

Table 1. Comparison of peri-operative outcome between two groups

	<90d (N=179)	=90d (N=179)	P value
Type of anastomosis			>0.99
stapled	20 (11.2%)	20 (11.2%)	
sutured	159 (88.8%)	159 (88.8%)	
Management of ileostomy site skin			1
closed	3 (1.7%)	3 (1.7%)	
open	7 (3.9%)	7 (3.9%)	
purse string	169 (94.4%)	169 (94.4%)	
EBL	33.3±106.9	29.4±35.2	0.32
Operative time (min)	79.0±43.7	72.4±31.0	0.17
LOS	4.5±3.4	4.6±4.1	0.59

\*Data were given as: mean± standard deviation (minimum- maximum).  
EBL: estimated blood loss LOS: length of stay

Table 2. Comparison of post-operative outcome between two groups

	<90d (N=179)	=90d (N=179)	P value
Wound infection	4 (2.2%)	3 (1.7%)	>0.99
Post-operative bleeding	1 (0.56%)	2 (1.1%)	1
Intra-abdominal abscess	1 (0.56%)	3 (1.7%)	0.62
Postoperative ileus	22 (12.3%)	24 (13.4%)	0.87
Postoperative SBO	6 (3.3%)	3 (1.7%)	0.50
Anastomotic leak	1 (0.56%)	1 (0.56%)	1
Reoperation	1 (0.56%)	3 (1.7%)	0.62
Surgery Related Readmission	1 (0.56%)	0 (0%)	0.85
Postoperative transfusion	1 (0.56%)	0 (0%)	1

SBO: small-bowel obstruction.

## ROBOTIC VERSUS STANDARD LAPAROSCOPIC ELECTIVE COLECTOMY: WHERE ARE THE BENEFITS?

P708

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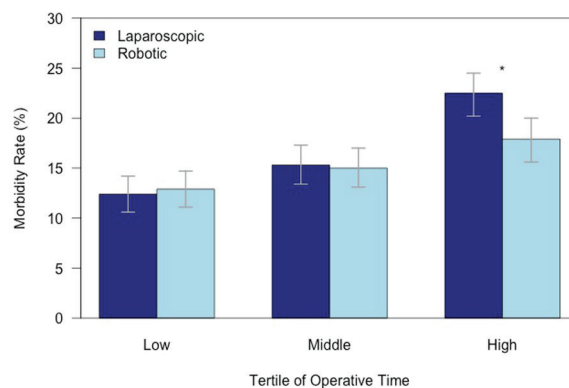
**Purpose/Background:** Robotic approaches for colorectal surgery have been popularized as experience with the new technology develops. Although some studies suggest a morbidity benefit with this approach, robotic approaches are frequently associated with longer operative time, but it is unclear whether prolonged operative duration in robotic cases correlates with increased morbidity. This study aims to compare the outcomes of laparoscopic and robotic non-emergent colon resections, after controlling for underlying variations in the patient populations and associated operative times, using a large national database.

**Methods/Interventions:** A retrospective cohort study was performed using the National Surgical Quality Improvement (NSQIP) Participant Use File and Targeted Colectomy databases to identify all patients undergoing non-emergent laparoscopic (LC) or robotic (RC) colon resections. Patient and disease characteristics were matched 1:1 between LC and RC cohorts without replacement using propensity score matching. To account for the relative prolongation in operative time associated with many robotic cases, operative times were stratified into approach-specific (LC or RC) tertiles (low, medium, and high) and used as covariates in the matching algorithm. Primary outcomes included postoperative morbidity (including anastomotic leak), length of stay, and 30-day readmission rates.

**Results/Outcome(s):** The proportion of RC increased significantly over time (from 658 cases in 2013 to 2,276 cases in 2015,  $p<0.001$ ) and had lower conversion rates (6%

among RC vs. 11.5% among LC,  $p<0.001$ ). RC cases were significantly longer than LC (226 minutes vs. 178 minutes,  $p<0.001$ ). Unadjusted complication rates were significantly higher in the LC cohort (17.5% vs. 15.2%,  $p<0.001$ ). After propensity score matching, RC was not associated with a significant difference in postoperative morbidity (15.2% among RC vs. 16.0% among LC,  $p=0.378$ ). After stratifying by tertile of operative time, cases in the lowest and middle tertiles had similar morbidity rates, and only RC cases in the highest tertile were associated with favorable outcomes (Figure). The robotic approach was associated with a one-half day shorter length of stay (4.6 days vs. 5.2 days,  $p<0.001$ ), however, it also had a higher 30-day readmission rate (8.9% vs. 7.5%,  $p=0.030$ ).

**Conclusions/Discussion:** After controlling for approach-specific operative duration and patient covariates, robotic approaches for colon resection are associated with similar rates of postoperative morbidity. While readmission rates were higher, RC was also associated with decreased conversion rates and shorter length of hospital stay. Furthermore, increased operative time noted in RC was not associated with the same extent of increased morbidity as in LC. Further studies examining cost are needed to evaluate whether these benefits offset the increased costs associated with robotic approaches.



Rates of postoperative morbidity between robotic and laparoscopic cases within each tertile of operative time. (\*) denotes  $p<0.05$ .

## COMPARISON OF THREE PROTECTOMY RISK CALCULATORS.

P709

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**Purpose/Background:** Several different risk calculators have been created to predict postoperative morbidity and mortality for colorectal surgery patients. These calculators, based off large patient databases (e.g. ACS-NSQIP), have rarely been compared to one another to assess their superiority. Such calculators may give patients better understanding, anticipation, and acceptance of surgical

complications, particularly for morbid operations such as proctectomy.

**Methods/Interventions:** A retrospective cohort was used to evaluate the three risk calculators. CPT codes were used to search for all patients who underwent proctectomy-associated procedures ( $n=448$ ) in the UT Physicians Group from Jan 2010-Oct 2016. Patients were assessed for 30 day complications based on follow up visits. These results were compared with anticipated morbidity and mortality retrospectively based off the risk calculators.

**Results/Outcome(s):** The University of Iowa Rectal Surgery Risk Calculator was found to be superior to the ACS-NSQIP Risk Calculator and P-POSSUM in predicting morbidity and mortality.

**Conclusions/Discussion:** The University of Iowa Rectal Surgery Risk Calculator should be the preferred model to estimate surgical risks in proctectomy patients. Further studies should evaluate this finding in a prospective fashion. Risk calculators should incorporate pertinent criteria from the Iowa calculator to estimate risk in proctectomy patients.

#### EMERGENT COLON RESECTIONS: DOES SURGEON SPECIALIZATION INFLUENCE OUTCOMES?

P710

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**Purpose/Background:** Relationships between high-volume surgeons and improved postoperative outcomes have been well documented. Colorectal procedures are often performed by general surgeons, particularly in emergent settings, and may form a large component of their practice. The influence of subspecialized training on outcomes after emergent colon surgery, however, is not well described. The aim of this study was to compare postoperative outcomes of cases performed by either specialized colorectal surgeons or general surgeons after emergent colectomy.

**Methods/Interventions:** Data were obtained from the institutional National Surgical Quality Improvement Project (NSQIP) databases from three academic centers,

from time of enrollment in NSQIP to 2016. All colectomy procedures designated as emergent were included for analysis. Cases were stratified by involvement of either a colorectal surgeon (CRS) or a general or acute care surgeon (GS). Primary outcomes of interest, including postoperative morbidity, unplanned reoperation, 30-day mortality, and postoperative length of stay, were modeled using either multivariable logistic or linear regression to control for patient demographics, comorbidities, and illness severity. Furthermore, propensity score matching was utilized to isolate the effect of surgeon specialty on the primary outcomes in comparable cohorts of patients.

**Results/Outcome(s):** A total of 889 cases were identified: 592 (66.6%) were performed by CRS and 297 (33.4%) by GS. Unadjusted outcomes between cohorts are shown in Table 1. After controlling for underlying comorbidities, disease type and severity, and stoma formation, cases performed by GS were associated with significantly higher rates of postoperative morbidity (OR 2.08, 95% CI 1.49 to 2.92), unplanned major reoperation (OR 2.17, 95% CI 1.36 to 3.47), and 30-day mortality (OR 4.81, 95% CI 2.38 to 9.74). Additionally, postoperative length of stay was approximately 4.1 days longer among patients undergoing surgery by GS (95% CI 2.4 to 5.9). After propensity score matching, 242 patients formed each cohort. Between matched cohorts, surgery performed by CRS was associated with significantly lower postoperative morbidity, length of stay, and 30-day mortality (Table 1).

**Conclusions/Discussion:** After controlling for underlying disease states and illness severity, emergent colon resections performed by colorectal surgeons were associated with significantly lower rates of postoperative morbidity, and 30-day mortality when compared to general surgeons. The colorectal surgery service should be considered the service of choice to care for patients requiring emergent colectomy. Further studies investigating potential reasons behind these discrepancies, including both institutional and individual-level variations, are warranted.

#### P710 Outcomes between non-matched cohorts and propensity-matched cohorts.

Outcome	Full Sample			Propensity Score Matched		
	GS (n=297)	CRS (n=592)	p-value	GS (n=242)	CRS (n=242)	p-value
Morbidity	60.9%	39.9%	<0.001	57.8%	47.9%	0.026
Postoperative LOS (days)	15.1	9.1	<0.001	13.7	10.5	0.010
Unplanned reoperation	20.5%	8.5%	<0.001	16.1%	9.5%	0.070
30-day mortality	19.3%	5.1%	<0.001	19.4%	7.7%	<0.001

GS=general or acute care surgeons, CRS=colorectal surgeons, LOS=length of stay

## ARE WE NEGLECTING THE SPOUSES OF COLORECTAL CANCER PATIENTS: EMOTIONALLY AND ONCOLOGICALLY?

P711

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**Purpose/Background:** Lifestyle factors, especially dietary, have been linked to the development of colorectal cancer. However, spouses who often share similar lifestyle habits with these patients may not be aware of this risk. This study aims to explore the various issues from the spouses' perspectives on screening for colorectal cancer.

**Methods/Interventions:** A qualitative study was carried out at a single tertiary healthcare institution. Semi-structured interviews were conducted on spouses of colorectal cancer patients using open-ended questions via a phenomenological approach until data saturation was encountered. Qualitative data collected from the interviews were thematically analysed. The colorectal cancer screening guidelines used were recommended by the Ministry of Health, Singapore.

**Results/Outcome(s):** Forty spouses were recruited for the study between March 2016 and October 2016, with a median age of 61 (range: 41 – 79) years. Data saturation was encountered at the 35<sup>th</sup> participant and five main themes emerged. (1) **Poor understanding of local colorectal cancer screening guidelines.** Majority of the participants were oblivious towards the need for an annual faecal immunochemical test (FIT). Barriers to the uptake of the FIT include (i) fear, (ii) cost, (iii) inconvenience and (iv) perceived invulnerability. (2) **Increased interest and awareness regarding colorectal cancer and its screening guidelines after spousal diagnosis of colorectal cancer.** Participants were more attentive to the relevant information about the disease entity. (3) **Proactive modes of communication are perceived to be required in the dissemination of health awareness information on the main stream media.** Health promotional efforts by the Health Ministry was deemed sufficient. However, if people are unaware and unengaged by the topic, they may not pay attention to the details. There is a need for active engagement between the public and the government. (4) **Need for spousal support.** Mutual spousal support was sufficient during the difficult times after knowledge of the cancer diagnosis. Only a minority group required psychological assistance. (5) **Negligible change to spouse's lifestyle.** General lifestyle habits (i.e. diet and exercise) did not differ pre and post diagnosis. There was no active interest by participants to gather information about screening. Information retrieval was passive and obtained from healthcare workers.

**Conclusions/Discussion:** Attention directed heavily on colorectal patients may result in a lost opportunity to intervene and increase colorectal cancer screening uptake amongst spouses. Spouses also experience immense

emotional struggles and should be supported as well during the journey of the patient.

## DOES TRAINING LEVEL AFFECT LEARNING IN A VIRTUAL ENVIRONMENT?

P712

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**Purpose/Background:** Objective: This study was conducted to help validate virtual training exercises and performance improvement across resident training levels. It is thought that the more years of residential training would extrapolate to higher scores and better ability to learn new skills using minimally invasive surgical robots.

**Methods/Interventions:** Post-graduate surgical trainees, grouped as juniors (PGY 1-3) and seniors (PGY 4-5) were asked to complete virtual reality training exercised on the DaVinci robot simulator. These exercises consisted of needle control, needle driving and energy switching. In the first exercise, the residents were required to pass a needle through various sized circular loops. In the needle driving, the task was to pass a needle through a virtual sponge. In the third exercise, energy switching, two different instruments with two types of energy were used to complete the task. Each task had different skill sets and required use of both hands as well as the foot pedal controls of the robot. An overall efficiency of motion score was calculated by the simulator and recorded. Residents attempted the exercise without practice or ever seeing the exercise and received a pre-test score. Each exercise was then completed five times before taking a post test, receiving another efficiency of motion score. The pre and post test scores were then averaged within groups (juniors and seniors) and compared.

**Results/Outcome(s):** The scores of all juniors and seniors were averaged and pre- tests were compared to post tests. In the first activity, needle control, the junior resident efficiency of motion score increased a total of 30% (53-83%) while the senior residents improved slightly less at 29% (48-77%) In the second test, seniors improved a total of 22% (53-77%) while the juniors only improved 5% (66-71%) In the energy switching test, the junior residents increased 28% (66-94%) while the senior residents improved 10% (78-88%)

**Conclusions/Discussion:** It appears that all trainees start at similar levels on the pre-test and improve at similar rates. Training level does not affect the ability to learn new virtual reality skills; the learning curve for junior and senior residents is the same. Earlier formal virtual and robotic training during residency training should be considered.

### GOOD OUTCOMES CAN BE ACHIEVED WITH A SELECTIVE APPROACH TO NEOADJUVANT CHEMORADIOTHERAPY FOR RECTAL CANCER.

P713

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**Purpose/Background:** Current guidelines advocate for the use of neoadjuvant chemotherapy and radiotherapy in the treatment of rectal cancer, particularly for American Joint Committee on Cancer (AJCC) stage II and III disease. However, this may overtreat some patients. Emerging evidence supports a more selective approach, particularly in the setting of modern surgical techniques such as total mesorectal excision (TME). The current study is an observational study analyzing treatment and outcomes in patients with rectal cancer who were treated with neoadjuvant therapy selectively.

**Methods/Interventions:** Patients undergoing resection for rectal cancer at our two institutions between January 2000 and December 2011 were included from a retrospectively maintained database. During this period, the decision to use neoadjuvant treatment was based on clinical, endoscopic and MRI findings; these were used to determine the likelihood of tumour resection with clear circumferential resection margins and sphincter-preservation. Resection was performed by TME, by either an open or laparoscopic-assisted approach.

**Results/Outcome(s):** A total of 267 patients undergoing resection for rectal adenocarcinoma were included, including 164 with AJCC stage II and III disease. Sphincter-preservation was possible in 86.7% of patients. Neoadjuvant treatment was used in 13.3% of patients, including 14.6% of patients with stage II and III disease. Median duration of follow up was 62 months. Positive circumferential resection margin (pCRM) rate was 6.8% for all stages of disease, which reduced to 4.2% of tumours resected with curative intent. pCRM rate reduced further to 2.5% when T4 tumours were excluded. Local recurrence rate for all stages of disease, and for stages I-III was 7.6% and 6.9%, respectively. Disease free survival for stage I, II and III disease was 86%, 70% and 65% respectively. A subgroup analysis of patients with resectable disease (AJCC stage I-III) was performed to assess the impact

of judicious use of neoadjuvant treatment on outcomes. Results are shown in the table below. Positive circumferential resection margin and disease-free survival rates are comparable to data from the Cleveland Clinic during an almost identical time period for stage I (86% vs 80%), stage II (70% vs 70%) and stage III (62% vs 58%).

**Conclusions/Discussion:** There is a paucity of data reporting long term outcomes of the treatment of resectable rectal cancer using neoadjuvant treatment selectively. Despite our low rate of neoadjuvant treatment use in comparison to the published literature, the results of this study suggest that good local control and survival can be achieved when neoadjuvant treatment is employed using a judicious protocol. Further, careful selective use of neoadjuvant treatment may obviate the risk of excess radiotherapy-related morbidity and mortality. The positive circumferential resection margin in this study is comparable to the published literature.

### IS STRAIGHT-TO-TEST COLONOSCOPY A FEASIBLE STRATEGY IN ASSESSING 2 WEEK WAIT PATIENTS?: A PROSPECTIVE QUALITY IMPROVEMENT FEASIBILITY PILOT STUDY.

P714

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**Purpose/Background:** A previous retrospective audit between 2009 and 2014 of suspected colorectal cancer referrals to Barking Havering and Redbridge (BHR) NHS Trust determined that the total number of urgent referrals had been significantly increasing yearly. It was hypothesised that a "Straight-To-Test (STT)" strategy, integrating the first outpatient appointment and colonoscopy, could improve efficiency. Uncertainty remained over the feasibility of undertaking this within the 2 week target.

**Methods/Interventions:** A prospective quality improvement audit involving 452 urgent lower GI referrals from November 2015 to July 2016 at BHR NHS Trust was designed to investigate the feasibility of STT strategy. All 2 week wait target referrals to the Lower GI unit were screened and stratified for eligibility for STT. Eligible patients were telephone triaged and offered a STT appointment. Those not eligible had standard urgent outpatient

**P713 Comparison of outcomes for patients with resectable rectal cancer (AJCC stage I-III)**

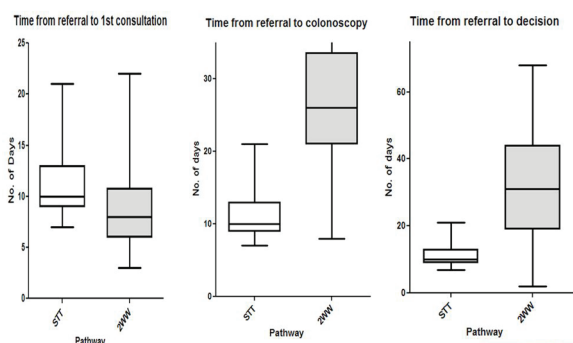
	Local recurrence rate	Overall survival
Moloney et al (present study)	6.9% (all stage I-III) 5.5% (surgery only)	72%
Dutch TME group	5.6% (neoadjuvant) 10.9% (surgery-only)	64.2% (neoadjuvant group) 63.5% (surgery only group)
German rectal cancer trial	6%	76% (preop treatment) 74% (post op treatment)

appointments. Data for these patients were also collected prospectively for comparison.

**Results/Outcome(s):** Of the 452 patients undergoing telephone triage, 187(41%) patients failed to meet eligibility criteria. Of 265 eligible patients, 255 (96%) proceeded to STT. 253/255 (99%) completed colonoscopy. 254/255 (96%) met the 2 week wait target with a median and range of 10 (6-21) days. In 210/253 (83%) STT patients, the decisions to discharge from the treatment pathway was made at the time of colonoscopy, median 10 (6-21) days. In comparison, data for a group of 252 patients who could not have STT and were offered urgent clinic appointments was also gathered. 5/252 (2%) breached the 2 week target, with an overall median time from referral to first consultation 8 (3-22). A median period of 31 (4-68) days was needed to discharge these patients from the treatment pathway.

**Conclusions/Discussion:** Organising STT with appropriate patient selection is feasible within a 2 week period and improves definitive decision making for suspected cancer patients.

### COMPARING PATHWAYS



### A NOVEL PREDICTIVE MODEL OF THROMBOEMBOLISM FOR COLORECTAL CANCER IN EARLY TREATMENT PERIOD – INTERIM RESULTS FROM A PROSPECTIVE COHORT STUDY.

P715

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**Purpose/Background:** To develop a risk-prediction model and decision-making algorithm for appropriate thromboembolism (TE) prevention during definitive therapy for colorectal cancer (CRC).

**Methods/Interventions:** Single centre, prospective observational study, profiling patients with CRC using clinical-, tumour- and treatment-related risk factors, in conjunction with biomarkers during treatment. Biomarkers include Haemoglobin, Leukocyte, Platelets, D-dimer, Fibrinogen, FVIIIc, thrombomodulin, thrombin-antithrombin complex, von Willebrand factor, prothrombin fragments

1+2, fibrin monomers, thromboelastography measurements (TEG-MA, -R, -K). Anti-cancer management is per clinician discretion and/or concurrent interventional study protocol. Biomarkers were assessed at baseline and 1 week after commencing treatment

**Results/Outcome(s):** The cohort for analysis included 76 patients, 32 (42%) females, median age 66 years (range 49-83). 10 patients (13%) developed TE while on study. Patients who developed TE demonstrated a biomarker profile indicative of a hyper-coagulable state. Khorana score did not adequately stratify or predict TE in this cohort (PPV 13.2%, NPV 0%), with majority of the patients classified as low or intermediate risk (score 1 (52%), 2 (40%)). Area under ROC curve was 0.556 (p=0.6) shows the inadequacy of the Khorana scoring system for TE prediction. By contrast, patient's Age  $\geq 50$  + BMI  $\geq 30$  + 1 week post-treatment leukocyte count  $\geq 7.8 \times 10^9/L$  as a single measurement showed improved power for ruling out a TE event with NPV of 97% whilst predicting TE with PPV of 40%. Furthermore, area under ROC curve was 0.84 (p<0.001), predicting TE with more accuracy in post-treatment CRC patients.

**Conclusions/Discussion:** TE remains a frequent complication among cancer patients, with substantial adverse health and economic consequences. This study demonstrated a high TE risk among patients with CRC receiving anti-cancer therapy. Risk stratification and predictive modeling tools, are important enablers to facilitate better targeted management strategies, to improve patient outcomes. Appropriate thromboprophylaxis can reduce TE rates up to 80% in at-risk patients. Simple clinical information and routine biomarkers can stratify TE risk in the early treatment period. Ongoing analyses with a larger cohort and longer follow-up will culminate in a simple interface (smartphone App) which combines key clinical and laboratory parameters, for real-time personalised assessment in the clinic. The App would provide a simplified risk assessment tool and decision-making algorithm, with guidance and recommendations for the most appropriate TE preventative strategy, in terms of regimen and duration.

### CHANGING TRENDS IN THE ADOPTION OF LAPAROSCOPIC COLORECTAL SURGERY: A NATIONAL INPATIENT SAMPLE STUDY.

P716

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**Purpose/Background:** Laparoscopic colorectal surgery has been evolving over the last three decades with increasing adoption of its use by surgeons in the recent years. Trends in its use for various colorectal resections

are unknown. The aim of our study was to assess trends of laparoscopic colectomies and its variation.

**Methods/Interventions:** National Inpatient Sample (NIS) Database was used to identify patients who underwent colectomy between 2008 and 2011. Laparoscopic versus open colectomies both in the emergency and elective setup were identified and evaluated. Outcomes of interest included trend of laparoscopic versus open colectomies over the years and identify variation in types and cost of the laparoscopic versus open colectomies.

**Results/Outcome(s):** A total of 228,654 colectomies were identified over the 4-year period. The rate of laparoscopic colectomies increased significantly from 7.1% (4,108/57,897) in 2008 to 32.9% (n=19,926/60,478) in 2011. The emergency laparoscopic colectomies increased from 3.2% in 2008 to 15.3% in 2011. The mean hospital length of stay decreased significantly from  $10.6 \pm 12.1$  in 2008 to  $10.04 \pm 11.8$  in 2012 ( $p < 0.0001$ ) while average charges was increased from  $80073\$ \pm 108374\$$  in 2008 to  $95859\$ \pm 147,204\$$  in 2011 ( $p < 0.001$ ).

**Conclusions/Discussion:** The rate of elective and emergency laparoscopic colectomies have increased significantly over the last few years in comparison to open procedures. This changing trend is associated with a decrease in hospital length of stay after colectomy.

#### THE PERITONEAL SURFACE DISEASE SEVERITY SCORE IS A PREDICTOR OF RESECTABILITY BUT NOT A GOOD PROGNOSTIC FACTOR IN TREATMENT OF COLORECTAL PERITONEAL CARNINOMATOSIS.

P717

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**Purpose/Background:** The peritoneal surface disease severity score (PSDSS) is a prognostic tool for colorectal peritoneal carcinomatosis, and can be quite useful in the decision for these patients into, and their stratification within clinical trial. PSDSS include PCI, primary site histology and clinical symptoms. PCI can predict completeness of cytoreduction score, how about PSDSS?

**Methods/Interventions:** Forty-five patients received cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC) or early postoperative intraperitoneal chemotherapy (EPIC), then received postoperative chemotherapy with or without target therapy. Associations between the completeness of cytoreduction and the PSDSS stages or other variables were assessed using chi-square analysis, Fisher's test and Logistic regression. Survival were analyzed using the Kaplan-Meier method, the log-rank test and Cox hazard model.

**Results/Outcome(s):** Optimal cytoreduction such as CCO or CCI was achieved in 38 patients, and were classified as PSDSS stage 1 for 8 patients, PSDSS stage 2 for 16

patients, PSDSS stage 3 for 16 patients and PSDSS stage 4 for 7 patients. Other seven patients received palliative surgery and were classified as PSDSS stage 2 (1 patient) or PSDSS stage 4 (6 patients). Twelve of 38 patients who had received optimal cytoreduction recurred, and 4 of 7 patients received palliated surgery progressed with TTP in 5 months. PCI but not PSDSS stage was a good prognostic factor, because PSDSS include primary site pathology score. There were 10 patients with mucinous adenocarcinoma, which has different prognostic outcome, with good prognosis when primary site is from right side colon (9 in these patients).

**Conclusions/Discussion:** The peritoneal surface disease severity score can be a predictor of the completeness of cytoreduction scores, but not a good prognostic tool in treatment of colorectal peritoneal carcinomatosis and need be improved.

#### FAILURE TO RESCUE ANASTOMOTIC LEAK AFTER COLECTOMY: ARE THERE MODIFIABLE RISK FACTORS FOR MORTALITY?

P718

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**Purpose/Background:** Historically, mortality rates for anastomotic leak after colectomy is up to 30%. Advances in perioperative care have likely reduced mortality after leak, but this is largely un-defined. We aimed to define factors associated with mortality after a leak has occurred using a large national database.

**Methods/Interventions:** We used the National Surgical Quality Improvement Program (NSQIP) Participant User File Colectomy Module, from 2012 – 2014. Patients who had fecal diversion were excluded. We sought factors associated with 30-day mortality in the subgroup of patients with a registered anastomotic leak by using univariate and multivariate analysis of Colectomy module specific variables (plus age and gender).

**Results/Outcome(s):** Of a total of 47,837 primary un-diverted colectomy cases, anastomotic leak occurred in 1,745 (3.6%). Leaks significantly increased overall mortality (no leak 1.6% vs. 6.6% leak,  $p < 0.001$ , odds ratio 4.4 [3.4 – 5.2]). Of the leaks, 1,026 (59%) resulted in reoperation, 388 (22%) required percutaneous drain, and mode of leak treatment was significantly associated with mortality rate (reoperation 8%, no intervention 5.8%, other means 4.6%, percutaneous drain 2.3%  $P = 0.006$ ). Major differences in Colectomy module variables between Survived vs. Expired are shown in **Table 1**. Multivariate analysis confirmed that older age, emergent case, open approach, no mechanical bowel prep, and diagnosis of neoplasia/other were all independently associated with a higher risk of mortality after leak. Limitations of this study



include lack of generalizability to non-participating hospitals; limited to 30 days outcomes.

**Conclusions/Discussion:** Using the NSQIP Colectomy module, we found that the overall colectomy anastomotic leak rate was only 3.6%, with a post-leak mortality rate of 6.6%. Our data suggests rescuing patients from anastomotic leak after colectomy may focus strategies on emergent colectomy patients. Unless completely obstructed, this population may benefit from both a mechanical bowel prep and laparoscopic approach which is under-utilized in the United States.

**Table 1. Baseline Differences in Colectomy Module Specific Variables Between Survived and Expired.**  
\* After Anastomotic Leak. Note baseline post-leak mortality = 6.6%

	Survived	Expired	Univariate p-value	Odds ratio (95% C.I.)	Multivariate p-value
Age, in years	59.1 (+/- 15)	71.6 (+/- 11)	<0.0001	0.94 (0.92-0.96)	<0.0001
Female Gender	729 (93.2%)	53 (6.8)	P=NS	--	--
Emergency operation	212 (85%)	37 (14.9%)	<0.0001	1.95 (1.15 - 3.3)	0.01
Elective operation	1417 (94.8%)	79 (5.2%)			
Open index operation	714 (90.4%)	76 (9.6%)	<0.0001	0.38 (0.19 - 0.69)	0.001
-Converted	157 (93.4%)	13 (7.7%)			
-Robotic	35 (94.6%)	2 (5.4%)			
-MIS	724 (96.6%)	24 (3.2%)			
Steroids	150 (94.4%)	8 (5%)	P=NS	--	--
No steroids	1462 (93.2%)	106 (6.8%)			
Chemotherapy	83 (96.5%)	3 (3.5%)	P=NS	--	--
No chemotherapy	1520 (93%)	112 (6.9%)			
No mech. bowel prep	643 (89.9%)	72 (10.7%)	<0.0001	2.45 (1.48 - 4.49)	0.002
Yes mech. bowel prep	708 (96.6%)	25 (3.4%)			
No oral antibiotics	1118 (92.4%)	90 (7.3%)	P<0.05	--	NS
Yes oral antibiotics	266 (96%)	11 (4%)			
Indication			<0.0001	2.96 (1.4 - 7.3)	P = 0.003
-Neoplasia	733 (92.7%)	58 (7.3%)			
-Other	384 (89.1%)	47 (10.1%)			
-Diverticular disease	367 (97.6%)	9 (2.4%)			
-IBD	146 (99.3%)	1 (0.68%)			

\*Figures represent mean (std dev), or frequency (proportion)

### COMPLIANCE WITH ENHANCED RECOVERY AFTER SURGERY (ERAS) PATHWAYS IMPROVES OUTCOME IN PATIENTS UNDERGOING BOTH OPEN AND LAPAROSCOPIC COLORECTAL PROCEDURES.

P719

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**Purpose/Background:** Implementation of ERAS pathways improves outcome in patients undergoing open colorectal surgery (OS), but there remains uncertainty whether patients having laparoscopic surgery (LS) benefit from care in an ERAS program. The objective of this study was to determine the impact of ERAS on outcome in LS and OS patients, focusing on whether compliance with postoperative ERAS recommendations influenced postsurgical recovery.

**Methods/Interventions:** All patients having colorectal surgery at 15 academic hospitals were enrolled in a government-supported ERAS implementation program. Outcome data and compliance to ERAS guidelines were collected prospectively. Patients were considered compliant if they adhered to >75% of the predefined guidelines for postoperative ERAS.

**Results/Outcome(s):** Between September 2012 and April 2015, 2,876 patients (48% female; mean 60 years old) were enrolled. Of 1520 LS patients (53% of total population), 78% had a neoplasm and 11% had IBD compared with 58% and 25% respectively in OS patients. 41% of patients in the LS group had a right colon resection compared to 18% in the OS group. For the overall patient population, length of stay (LOS), % patients with LOS <5d, and readmissions were better in the LS group compared to OS (See "All patients" in Table 1). Compliance with post-operative ERAS guideline recommendations following OS was associated with decreased LOS (RR 0.66, 95% CI 0.61-0.72, p<0.001), and more patients with LOS < 5d (RR 1.68, 95% CI 1.45- 1.95, p<0.001). ERAS also exerted significant improvements in LS patients, reducing LOS (RR 0.79, CI 0.72 to 0.86, p<0.001) and increasing the percentage of patients discharged within 5 days (RR 1.95, CI 1.51 to 2.51, p<0.001). Importantly, ERAS in both settings had no effect on readmission rates.

**Conclusions/Discussion:** Patients having colorectal surgery have reduced hospital stays when treated with LS, compared to OS. The addition of an ERAS pathway further benefits patients, whether undergoing open or laparoscopic surgery. Broad application of ERAS following colorectal surgery appears to improve surgical outcomes.

### 30-DAY READMISSION FOLLOWING COLORECTAL SURGERY IN A RURAL STATE: DOES DISTANCE MATTER?

P720

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**Purpose/Background:** Hospital readmission after colorectal surgery (CRS) occurs in approximately 10-15% of patients, often resulting in costly additional interventions and denial of reimbursement. Additionally,

### P719 Effect of ERAS compliance in LS versus OS colorectal surgery

	Lap Surgery (n=1520)			OS/converted Surgery (n=1356)		
	LOS (days)*	LOS<5d (%)	Readmit (%)	LOS (days)*	LOS <5d (%)	Readmit (%)
All patients	4 (3-6)†	72.0†	6.5†	7 (5-9)	34.2	10.0
ERAS compliant **	4 (3-5)	78.4	6.0	6 (4-7)	49.4	9.5
ERAS noncompliant**	5 (3-7)	65.4	7.1	7 (5-10)	28.1	10.3

\*Data are expressed as median and interquartile range; †: p<0.05 vs OS/converted for each parameter measured;

\*\*RR values and 95% CI with statistics comparing ERAS compliant vs noncompliant are in text.

occurrence and indication for readmission are important quality indicators for both institutions and individual surgeons. Socioeconomic factors predicting risk of readmission remain unclear. In this study, we aimed to identify patient factors, including distance from hospital and presence of psychiatric disorders and their association with readmission following CRS.

**Methods/Interventions:** We performed a retrospective chart review of patients 18 years and older undergoing CRS at our tertiary care center from 2008-2014. Patient demographics, including place of residence and number of miles from our center, 30-day readmissions and indication for readmission were examined. Chi-square and Wilcoxon tests assessed nominal and continuous variables, respectively. We employed univariate and multivariable logistic regression to assess the association between readmission and covariates, reporting odds ratios (OR) and 95% confidence intervals (CI). P-values < 0.05 were considered significant.

**Results/Outcome(s):** 740 patients met inclusion criteria. Males comprised 55% of our cohort, and the mean age was 53.9 years. The majority of patients were discharged home after surgery (81%). Diagnosis of neoplasm prompted surgery in 47% of patients, while 14% were secondary to an infectious process. 114 readmissions were recorded (15.4%). No significant differences in readmission rates were found based on sex, age, indication for surgery, post-discharge disposition, emergent nature of surgery, or presence of an Axis 1 or 2 disorder. Increasing distance from our center was strongly associated with a lower likelihood of readmission ( $p=0.004$ ). Each additional increment of 50 miles was associated with an OR decrease of 0.3 (OR = 0.69, 0.54-0.89). Increasing operative time was associated with an increased likelihood of readmission, with each additional 30 minutes associated with an OR increase of 0.1 ( $p<0.0001$ ). Creation of a new ostomy was significantly associated with readmission (OR 1.72, 1.09-2.72,  $p=0.02$ ). Multivariable logistic regression revealed that operating time greater than 120 minutes (OR = 2.42, 1.28-4.59,  $p=0.007$ ) and creation of an ostomy (OR 1.80, 1.13-2.86,  $p=0.014$ ) were associated with an increased rate of readmission.

**Conclusions/Discussion:** We found a lower likelihood of readmission with increasing distance from our center. Readmission rates in these patients are likely to be underestimated if admitted at a non-index hospital. Alternatively, surgeons may be more likely to delay discharge in patients living in remote areas. These findings suggest that more vigilant follow-up in clinic, by phone or telemedicine appointments, should be considered in high risk patients with new ostomy creation and longer operative times.

## THE MANAGEMENT OF RECTOVAGINAL ENDOMETRIOSIS IN AN ACCREDITED SPECIALIST CENTRE.

P721

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**Purpose/Background:** The laparoscopic surgical treatment of recto-vaginal endometriosis is challenging and needs to be planned and managed by a multidisciplinary team that includes colorectal, urological as well as gynaecological surgeons. The British Society for Gynaecological Endoscopy (BSGE) mandated in 2013 that outcome data was collected so that patients could be better informed on the prospects of surgery. We present the data collected at a BSGE accredited centre.

**Methods/Interventions:** A prospective database was compiled of all patients undergoing laparoscopic surgery for excision of recto-vaginal endometriosis. Demographics, operative times, surgical team present (gynaecology, colorectal or urology), and complication rates were recorded. Before surgery a pre-operative dyschaezia score and visual analogue score (VAS) for overall pain were recorded (a score out of 100), which was then repeated 6 months after the operation. These parameters were then analysed to assess the service provided at our institution for laparoscopic treatment of rectal-vaginal endometriosis.

**Results/Outcome(s):** Between January 2014 and September 2016 a total of 63 patients underwent laparoscopic surgery for excision of recto-vaginal endometriosis. A total of 18 cases had another surgical team present other than gynaecology (15 cases colorectal and 3 cases urology) and the mean operating time was 178 minutes (range 73-309). There were no deaths, no anastomotic bowel leaks and no other major complications. The mean pre-operative VAS was 47% (range 0-95%) and mean dyschaezia score was 60% (range 0-100%). 6 months post operatively the mean VAS was 67% (range 0-100%) and mean dyschaezia score was 36% (range 0-100%).

**Conclusions/Discussion:** Laparoscopic surgery for recto-vaginal endometriosis is complex. A multidisciplinary approach helps pre operative planning of procedure, resources and patient counselling. The information collected helps provide better information of clinical outcomes and complication rates that is useful when planning future services and when guiding patients to the likely outcome of surgery. As healthcare resources are further squeezed, we believe this approach has many benefits not only to the patient but to the healthcare provider and commissioners.

## INTER-RELATIONSHIP OF SELECTED PATIENT REPORTED OUTCOME INSTRUMENTATION SYSTEM (PROMIS) DOMAINS FOR INITIAL ASSESSMENT OF PATIENTS WITH COLORECTAL DISEASE.

P722

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**Purpose/Background:** Patient reported outcomes (PROs) have an important role in understanding the impact of therapy on patients and increasingly being integrated in quality improvement programs and payment models. To date, disease specific measures have prevented generalizability while generic measures have not been sensitive to issues associated with colorectal patients. PROMIS, a generic measure set developed with modern psychometric methods, maybe an effective method of capturing meaningful PROs in colorectal patients. We explore the utility of PROMIS scales in measuring outcomes in colorectal clinics within a large multi-site academic medical center with a robust electronic platform.

**Methods/Interventions:** Patients in the ambulatory setting at the University of Rochester are asked to complete PROMIS items at each encounter through an electronic platform that is integrated with the electronic health record (EMR). Since February, 2015, patients presenting to the colorectal clinic complete the Physical Function (PF), mood (M), anxiety (AX) and pain interference (PI) PROMIS scales. To assess the utility of these scales for colorectal patients, we evaluated the correlations with the scales as well as the ability of the PF, M, AX PROMIS scales to predict pain.

**Results/Outcome(s):** A total of 4207 patient visits with 1372 new visits occurred since the inception of the PROMIS platform. A total of 450 patients completed the subscales at their first visit (32.8%, 450/1372). The median age of responders was 52.1 (+/-17.7), with 55.3% being female and diseases included colon cancer, rectal cancer, diverticular disease, inflammatory bowel disease, rectal prolapse, pelvic floor disorders, and The correlation between PROMIS scales was documented to understand how each scale is inter-related to the other. Then multiple linear regression was used to assess how PROMIS PF, Mood, and AX influence PI. Age was also entered as a covariate in the multivariate analysis. There were significant univariate correlations among PROMIS scales. The highest correlation was between Mood and AX ( $r=0.83$ ,  $p<0.01$ ) and lowest significant correlation was between PF and AX ( $r = -.42$ ,  $p<0.01$ ). The multiple linear regression indicated that the combination of Mood ( $p<0.01$ ), PF( $p<0.01$ ), and Age( $p<0.01$ ) significantly predicted the PI score ( $r = 0.72$ ,  $p<0.01$ ).

**Conclusions/Discussion:** All 4 PROMIS domains appear to be important in capturing patient reported

outcomes in the colorectal patient. Moreover, PF, Mood, and age independently contribute to pain interference in patients with colorectal disease. This data demonstrates that the selected PROMIS domains show important inter-relationships across patients with colorectal disease.

## WHAT CAN THE SURGEON DO TO REDUCE THE RISK FOR PROLONGED POSTOPERATIVE OPIOID USE?

P723

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**Purpose/Background:** Opioid related deaths have increased substantially over the past 10 years placing clinician's prescription practices under intense scrutiny. Colorectal surgeons perform procedures associated with significant postoperative pain and thus opioid prescription practices are an important practice consideration. Given the substantial risk of opioid dependency after colorectal surgery, we sought to analyze risk of post-operative prolonged opioid use after colorectal resections.

**Methods/Interventions:** We analyzed all consecutive patients who underwent an abdominopelvic procedure with resection from January 1, 2008 through December 31, 2014 at a tertiary care facility. First, we determined the patient's post-operative opioid prescriptions on discharge and their total opioid medication use. Then we abstracted covariates such as patient demographics, American Society of Anesthesiologists (ASA) score, history of benzodiazepine use, history of chronic pain, emergency surgery, use of laparoscopy, stoma creation, readmission, and post-op complications. Last we developed multivariate models to identify risk factors for prolonged opioid use (>30 days after incident surgical procedure).

**Results/Outcome(s):** We identified 4,089 procedures out of 9,423 recorded surgical events. Of that total, 2173 had an abdominopelvic procedure with intestinal resection, and survived  $\geq 1$  year. Of the total group, 91% ( $n=1981$ ) were discharged on opioids, and 98% ( $n=1955$ ) of those patients filled only one prescription. A total of 92 (4%) patients remained on opioids beyond 30 days and from this group 25% ( $n=23$  patients) at 90 days. In the multivariate analysis, we found no association between post-op complications, stoma formation, and patient sex with risk of prolonged opioid use. However younger age and past history of chronic pain were associated with substantial increased risk of prolonged opioid use. Lastly, use of laparoscopy attenuated the risk of prolonged opioid use (table)

**Conclusions/Discussion:** A small but considerable proportion of patients remain on postoperative opioids beyond 30 days. Predictors of opioid use for greater than 30 days were a history of chronic pain and younger age. The

use of laparoscopy reduced the overall risk of prolonged opioid use. Our study identified several immutable risk factors (history of chronic pain and decreasing age) that predicted prolonged postoperative opioid use; however, the surgeon may be able to reduce prolonged opioid use through the use of laparoscopic techniques.

### EVALUATING THE EFFECT OF INDOCYANINE GREEN FLUORESCENCE ANGIOGRAPHY ON ANASTOMOTIC LEAK RATE IN COLORECTAL SURGERY: A CASE-CONTROL STUDY.

P724

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**Purpose/Background:** Insufficient perfusion to anastomoses in colorectal surgery is known to lead to complications including strictures and anastomotic leaks. Conventional techniques to assess bowel viability such as palpating pulses, evaluating color, and inspecting for bleeding of cut edges remain important, but are all subjective measures. The SPY Elite Imaging System has been introduced to assess tissue perfusion using indocyanine green (ICG) fluorescence angiography. This tool provides objective, quantitative data when evaluating tissue perfusion prior to bowel anastomosis. This study aims to evaluate whether routine use of fluorescence angiography alters the incidence of anastomotic leaks after colorectal surgery.

**Methods/Interventions:** Over a three-year period, all colorectal resections using SPY fluorescence angiography at a single institution were retrospectively reviewed. This group was compared to a historical control group operated on by the same two surgeons, but without the use of SPY. For the cases in which SPY was used, the lowest absolute value was recorded as it theoretically represented the least well-perfused portion of the anastomosis. Multiple details

for both groups were recorded with the primary endpoint being an anastomotic leak.

**Results/Outcome(s):** In the three and a half years prior to the use of indocyanine green fluorescence angiography, 351 colorectal resections were done for benign and malignant disease. The SPY Elite Imaging System was utilized in 246 colectomies. There were four anastomotic leaks in the pre-SPY group (1.1%; 95% CI [0.3% - 2.1%]) and three with the use of SPY (1.2%; 95% CI [0.3% - 2.1%]). In thirteen cases (5.3%), additional proximal resections were performed due to low absolute values; none of these cases were complicated by a leak post-operatively.

**Conclusions/Discussion:** This analysis represents a case control study of 597 colorectal resections at a single institution with and without the use of the SPY technology. To date this is the largest collection of data using SPY as it pertains to anastomotic perfusion in colorectal surgery. The leak rate before the use of SPY was not significantly different when compared to the leak rate with the use of SPY ( $p > 0.05$ ). These results suggest that routine use of ICG fluorescence angiographic evaluation does not independently decrease the incidence of anastomotic leak when used by experienced colorectal surgeons. There are several limitations to this study including its retrospective nature. Randomized control trials are required to determine whether there is a benefit in using SPY Elite Imaging System to decrease anastomotic leaks in colorectal surgery.

### CREATION OF A SYSTEM-BASED MODULAR REPORTING TOOL (SMART) DASHBOARD FOR MONITORING PROCESS AND OUTCOMES OF AN ENHANCED RECOVERY PATHWAY.

P725

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**Purpose/Background:** Enhanced Recovery Pathways (ERPs) have been shown to improve quality of care by decreasing length of stay (LOS), improving patient outcomes, and decreasing overall cost of care in colorectal surgery patients. The ability to audit both process compliance and clinical outcomes is crucial to the successful implementation of such protocols, driving identification of problems and barriers and informing future protocol optimization. Monitoring compliance and outcome data can be tedious and cumbersome, and requires additional resources not available at many institutions. An automated process to provide feedback to the clinicians in a timely manner is paramount. This project aimed to create an automated dashboard reflecting process compliance and clinical outcomes for all colorectal surgery patients on an enhanced recovery pathway at a single institution, which would be used to provide feedback to surgeons and the

#### P723 Predictors Of Prolonged Opioid Use

Characteristic	OR (95% C.I.)	p Value
Increasing Age	0.96 (0.95-0.98)	0.0001
Female Sex	0.94 (0.61-1.46)	0.8
Increasing ASA	1.80 (1.09-2.93)	0.02
Use of Benzos	2.24 (1.32-3.80)	0.003
History Chronic Pain	12.70 (5.31-30.19)	0.0001
Emergent Surgery	0.77 (0.38-1.57)	0.5
Laparoscopy versus		
Open	0.61 (0.39-0.96)	0.03
Stoma Creation	0.73 (0.39-1.34)	0.3
Readmission	1.87 (1.01-3.11)	0.05
Postop Complication	1.13 (0.69-1.84)	0.6

multidisciplinary treatment teams in a frequent, timely manner.

**Methods/Interventions:** An interdisciplinary team comprised of clinicians, data analysts and health informatics specialists was assembled. All data analysis was carried out using SAS for Windows v9.4. Procedures coded in professional billing were used to identify unique colorectal inpatient hospitalizations for the pre- and post-implementation period. OR Log data was used to identify elective procedures which were classified by approach. Postoperative order set activation was used to identify patients receiving care on the pathway. The impact of the ERP was assessed by comparing a set of pre-identified process and outcome metrics.

**Results/Outcome(s):** Through an iterative process, our interdisciplinary team was able to generate an automated System-based Modular Reporting Tool (SMaRT) directly from information embedded in the EMR. This user-friendly dashboard is pushed to the clinical care team at regular intervals. Current metrics reflect both measures of process adherence and outcomes including LOS, return to surgery, 30-day all cause readmission, utilization of certain medications (antibiotics, antiemetics and analgesics), and time to milestones (foley removal, resumption of diet, ambulation, bowel function).

**Conclusions/Discussion:** It is feasible to create an automated reporting platform for ERPs that provides timely feedback to the clinical care team regarding both process adherence and patient outcomes. This SMaRT tool now serves as a platform for continuous quality improvement.

## UNPLANNED ROBOTIC CONVERSION TO OPEN COLORECTAL SURGERY RESULTS IN ADVERSE OUTCOMES.

P726

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**Purpose/Background:** Unplanned conversion to open is an important quality indicator for minimally invasive colorectal surgery. Laparoscopic unplanned conversion to open colorectal surgery is associated with a higher rate of morbidity and mortality, longer hospital length of stay and increased cost. Consequences of unplanned conversion to open in robotic colorectal resection of benign and malignant disease are largely unknown. The purpose of this study is to compare the short-term outcomes of converted robotic colorectal cases with those that are not converted and the open approach.

**Methods/Interventions:** The ACS-National Surgical Quality Improvement Program database was queried for patients who underwent open and robotic colorectal resection from 2011 through 2015. Short-term outcomes were analyzed using multivariate logistic regression analysis.

**Results/Outcome(s):** 25,253 patients underwent colorectal resection in the study period - 21,356 (84.5%) open, 3,663 (14.5%) robotic, and 234 (0.9%) unplanned conversion from robotic to open. The conversion rate for the robotic approach was 6.0%. Compared to robotic cases that were successfully completed as planned, cases that were converted to open had a significantly higher 30-day mortality rate ( $p < 0.01$ ) and a longer hospital stay ( $p < 0.01$ ). Converted patients also had significantly higher rates of the following complications: wound dehiscence ( $p < 0.01$ ), deep venous thrombosis ( $p = 0.03$ ), post-operative ileus ( $p < 0.01$ ), cardiac complications ( $p = 0.03$ ), re-intubation ( $p < 0.01$ ), re-operation within 30 days ( $p = 0.01$ ), surgical site infection ( $p < 0.01$ ), and sepsis ( $p = 0.02$ ). Compared to the open approach, converted patients had a significantly shorter length of stay ( $p < 0.01$ ) and a higher rate of reintubation ( $p = 0.02$ ). No significant differences in mortality or other short-term outcomes were seen between open and converted patients.

**Conclusions/Discussion:** Unplanned conversion to open is detrimental to patient outcomes as demonstrated by higher rates of mortality, short-term complications and longer length of hospital stay. The continued pursuit of technologic advancements that decrease the risk for conversion in minimally invasive colorectal surgery are clearly warranted.

	Open (n=21,356)	Robotic (n=3,663)	Robotic Converted to Open (n=234)	p value
Covariate				
Age, Mean (SD)	62.34 (15.49)	58.81 (13.23)	60.62 (13.00)	<0.001
BMI, mean (SD)	23.18 (11.60)	19.39 (11.68)	22.18 (12.23)	<0.001
Male Gender n(%)	10,002 (0.47)	1811 (0.49)	134 (0.57)	<0.001
White Race n(%)	16,444 (0.77)	3054 (0.83)	183 (0.78)	<0.001
Smoker n(%)	3894 (0.18)	574 (0.16)	48 (0.21)	0.001
Diabetes n(%)	3406 (0.16)	528 (0.14)	34 (0.15)	0.055
Hypertension n(%)	10,442 (0.49)	1,711 (0.47)	132 (0.56)	0.003
CHF n(%)	265 (0.01)	11 (0)	0 (0)	<0.001
COPD n(%)	1,217 (0.06)	117 (0.03)	17 (0.07)	<0.001
Dyspnea n(%)	1,776 (0.08)	167 (0.05)	12 (0.05)	<0.001
Bleeding Disorder n(%)	984 (0.05)	76 (0.02)	7 (0.03)	<0.001
Disseminated Cancer n(%)	2,435 (0.11)	127 (0.03)	7 (0.03)	<0.001
Weight Loss n(%)	1,575 (0.07)	85 (0.02)	11 (0.05)	<0.001
Functional Status Independent n(%)	20,604 (0.96)	3,635 (0.99)	229 (0.98)	<0.001
ASA Classification n(%)				<0.001
ASA 1 or 2	7,900 (0.37)	1964 (0.54)	118 (0.1)	<0.001
ASA 3	11,939 (0.56)	1,638 (0.45)	106 (0.45)	
ASA 4	1,517 (0.07)	61 (0.01)	10 (0.04)	
Procedure Type				<0.001
Right Colectomy	6,101 (0.29)	627 (0.17)	33 (0.14)	
Sigmoid Colectomy	7,811 (0.37)	1,116 (0.3)	67 (0.29)	
Total Colectomy	1,395 (0.07)	75 (0.02)	7 (0.03)	
Rectal Resection	6,049 (0.29)	1,846 (0.5)	127 (0.54)	

Table 1. Patient Characteristics for Statistical Model

## LITIGATION RELATED TO 10 YEARS LOWER GASTROINTESTINAL ENDOSCOPY IN THE UNITED KINGDOM: IS THERE SCOPE FOR PREVENTION?

P727

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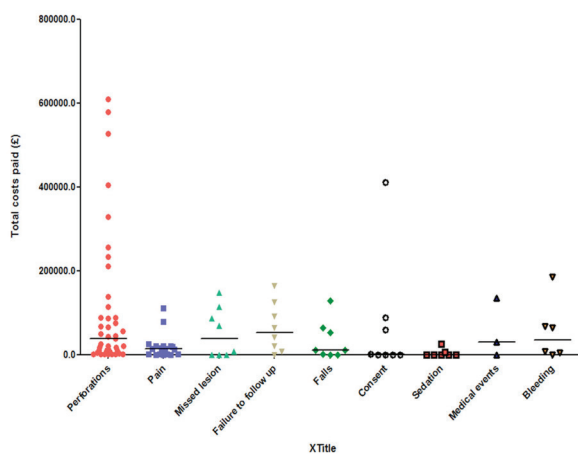
**Purpose/Background:** There has been an upward trend in the number of lower gastrointestinal endoscopy procedures (diagnostic and interventional) performed in the United Kingdom over the last decade. In parallel, the National Health Service (NHS) yearly expenditure for litigation-related costs has also been increasing significantly.

We aimed to determine the cost of negligence claims related to colonoscopies and flexible sigmoidoscopies and identify potentially preventable factors that lead to a successful claim.

**Methods/Interventions:** A retrospective analysis was undertaken of all litigation claims processed by the NHS Litigation Authority between 2003 and 2013 regarding lower gastrointestinal endoscopy. Evaluated outcomes included the result of claim (successful/unsuccessful), amount of damages paid to claimant and total cost per case, justification for claim (injury) and the percentage of compensated patients (paid to closed ratio).

**Results/Outcome(s):** A total of 167 cases were identified, 135 cases (80%) were closed and 84 claims were successful (62%). Total amount paid in damages to claimants was £4,617,126 and total costs incurred mounted to £7,809,790. Median damages paid per claim were £20,000 (range £50- £420,000) and the median total cost per claim was £47,000 (£1500- £610,000). Although yearly variation was noted, with a downward trend over the last five years, this was not statistically significant. Failure to follow up the results of endoscopy and biopsies, bleeding, pain, bowel perforation and mortality were the leading causes of claims resulting to compensation with 87%, 85%, 78%, 73% and 71% 'paid to closed' ratio respectively, also reflecting differences in total costs per injury (Figure).

**Conclusions/Discussion:** Consistent patient care post procedure, prevention of complications and optimisation of endoscopic techniques to minimise patient adverse experiences are practices that could help improve patient care and potentially prevent litigation in lower gastrointestinal endoscopy.



## WIDE VARIATION IN THE RATE OF POSITIVE CIRCUMFERENTIAL RESECTION MARGINS ACROSS SURGEONS AND HOSPITALS: A CALL FOR THE STANDARDIZATION OF RECTAL CANCER CARE.

P728

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**Purpose/Background:** Involvement of the circumferential resection margin (CRM) following radical resection is considered to be an appropriate marker of surgical quality and oncologic management. While studies have identified predictors of positive CRM among rectal cancer patients, there is insufficient data examining differences in this performance metric among surgeons and hospitals. The purpose of this study was to 1) characterize variation in positive CRM between individual surgeons and hospitals and 2) evaluate the downstream effect of positive CRM on prognosis.

**Methods/Interventions:** A retrospective cohort study was executed by merging the New York State Cancer Registry with the Statewide Planning & Research Cooperative System. Patients with a confirmed diagnosis of stage I-III rectal cancer who underwent proctectomy from 2010-2013 were identified. Bayesian multilevel logistic regression models were used to: 1) identify independent patient, surgeon, and hospital-level factors associated with the odds of having a positive CRM (1 mm or less), and 2) estimate risk-adjusted surgeon and hospital-specific rates of positive CRM. A multilevel competing-risks Cox proportional hazards model that accounted for propensity-score matching was used to evaluate the association between positive CRM and 5-year disease-specific survival.

**Results/Outcome(s):** Among 1,627 patients treated by 366 surgeons at 129 hospitals, 275 (17%) had a positive CRM. Factors independently associated with positive CRM include more advanced stage, congestive heart failure, an open versus minimally invasive approach, and undergoing abdominal perineal resection versus a lower anterior resection. There was a 15-fold difference in the risk-adjusted rate of positive CRM between surgeons (range=2%-31%, IQR=14%) and a 9-fold difference in the risk-adjusted rate of positive CRM between hospitals (range=3%-27%, IQR = 12%). After propensity-score matching, positive CRM was associated with worse 5-year disease-specific survival (HR= 1.97,95% CI=1.72, 2.36)

**Conclusions/Discussion:** There was wide heterogeneity in positive CRM between the best and worst performing surgeons and hospitals even after accounting for case-mix. Positive CRM resulting from an inadequate oncologic resection was associated with worse long-term prognosis. These results support standardization of surgical training that emphasizes the adoption of advanced imaging modalities and commitment to a multidisciplinary team

management approach. Such endeavors may substantially reduce unnecessary variation and improve quality of care delivered to rectal cancer patients.

### ILEORECTAL VS. ILEOCOLIC ANASTOMOTIC LEAK; AN ACS-NSQIP ANALYSIS.

P729

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**Purpose/Background:** Total abdominal colectomy (TAC) seems to have higher anastomotic leak rate than an ileocolic anastomosis even though it should not be based on blood supply alone. We sought to confirm this largely anecdotal observation and to identify the risk factors of anastomotic leak (AL) in patients undergoing TAC vs right hemicolectomy (RHC). Crohn's disease (CD) and colorectal cancer (CRC) are two diseases relatively commonly treated with TAC or RHC, and therefore are the basis of our study.

**Methods/Interventions:** The American College of Surgeons National Surgical Quality Improvement Program (NSQIP) colectomy targeted participant use data files were used to examine the clinical data of CD or CRC patients who underwent either elective TAC or RHC, with anastomosis, from 2012 to 2014. Patients with disseminated cancer were excluded. Multivariate regression analysis was performed to identify risk factors.

**Results/Outcome(s):** We sampled a total of 5917 patients who fit our inclusion criteria. Patients underwent elective TAC (586, 9.9%) and RHC (5331, 90.1%) resections. Of these, 177 (3%) had AL. AL was higher following TAC (5.3%) compared to RHC (2.7%) ( $P < 0.05$ ). TAC patients also had significantly higher mortality (1.4% vs. 0.7%, AOR: 2.86,  $P = 0.01$ ) and serious morbidity (32.8% vs. 20.8%, AOR: 2.16,  $P < 0.0001$ ). Patients with AL in TAC group required more interventional and reoperation for AL management compared to the RHC group (4.9% vs. 2.2%). Sub analysis was done for AL based on the diagnosis group. In CD, 192 patients underwent TAC (11.3%) and 1506 RHC (88.7%). Patients who underwent RHC had lower AL compared to TAC but the difference did not show significance (3.5% vs. 5.2%,  $P = 0.24$ ). History of smoking was the most important risk factor for AL in TAC group compared to RHC (AOR: 1.92,  $P = 0.02$ ). In CRC group, 394 patients underwent TAC (9.3%) and 3825 RHC (90.7%). In the CRC group, patients undergoing TAC had more than two times higher AL rate compared to RHC resections (5.3% vs. 2.4%,  $P = 0.007$ ). Ascites, history of smoking, and hypoalbuminemia were the most significant predictors of AL in TAC compared to RHC group ( $P < 0.05$  for all).

**Conclusions/Discussion:** Anastomotic leak occurred in 5.3% of TAC compared to 2.7% in RHC resections. There

was no significant difference seen in AL rate between TAC and RHC groups among the CD patients. However, in the CRC group the AL rate is significantly higher following TAC compared to RHC.

### RESULTS OF AN ENHANCED RECOVERY AFTER SURGERY (ERAS) PROTOCOL FOR COLORECTAL SURGERY IN A PUBLIC HOSPITAL IN CHILE.

P730

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**Purpose/Background:** Enhanced Recovery After Surgery (ERAS) protocols in colorectal surgery incorporate strategies in the perioperative care with the objective to decrease complications, hastens recovery and shorten hospital stay. Implementation of an ERAS protocol could be useful in Chile, especially in the setting of a high-demand bed public hospital. The aim of this study was to evaluate the results of an ERAS protocol for elective colorectal resections in a public hospital in Chile and assess its impact in hospital stay compared to historical data.

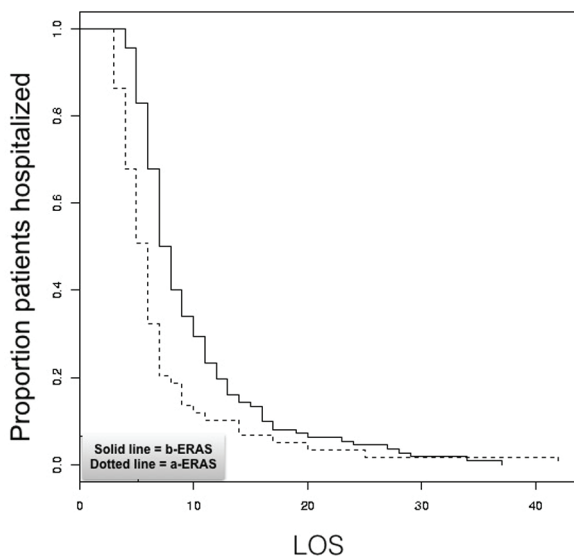
**Methods/Interventions:** Prospective study including patients between 15 to 85 years old undergoing elective colorectal resection at Hospital Doctor Sotero del Rio from January 2016 until November 2016. Patients with mayor neurologic disabilities (movement limitations and/or deglutition disorders), history of metabolic surgery, poor glycemic control defined as HbA1c  $> 8\%$ , end-stage renal disease in dialysis, diminished functional capacity, emergency surgery and/or intra-operative mayor adverse event were excluded. Protocol included preoperative advice, colon preparation only in rectal and left colon surgery, provision of carbohydrate-rich drinks one day prior and on the morning of surgery, deep venous thrombosis prophylaxis beginning 24 hours prior surgery, intra-operative goal directed fluid administration, early mobilisation and the taking of oral fluids in the early postoperative period. Demographic data, length of stay after the procedure (LOS), readmission, complication and mortality rate at 30 days was registered. To assess the global impact of ERAS protocol implementation in the LOS of all the elective colorectal procedures performed in our center, comparison between the 2012-2015 before ERAS implementation (b-ERAS) group and the 2016 after ERAS group (a-ERAS) was made.

**Results/Outcome(s):** A total of 45 patients were enrolled. Twenty seven patients (59,5%) were women. The mean age was 59,2 years (range 21-81). All patients received deep vein thrombosis prophylaxis the day before surgery; 71,41% received a mechanical bowel preparation and 88.1% completed the carbohydrate load. A

laparoscopic approach was performed in a 54,8% of the patients and 45,2% of the interventions corresponds to rectal resections. The median of stay was 4 days (range 3-19). Fourteen patients (33,3%) presented a complication: 12 were Clavien II or less, one Clavien IIIa and one IIIb. Five patients (11,9%) were readmitted before 30 days and no mortality was reported. Comparison between the b-ERAS and a-ERAS groups showed a 1 day decrease in LOS (Z-score = 4.8219) and shorter LOS in all quartiles was seen in the Kaplan-Meier curves (log rank  $p=0,005$ ).

**Conclusions/Discussion:** The implementation of an ERAS protocol for elective colorectal resections in a public hospital in Chile is associated with a shorter hospital stay, acceptable rates of morbidity and a low readmission rate.

### Kaplan Meier - Hospital Stay



### SORBITOL AND MANNITOL SOLUTION AS A SAFE ALTERNATIVE FOR INTRAOPERATIVE BOWEL PREPARATION.

P731

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**Purpose/Background:** Anastomotic leak represents one of the most serious and feared postoperative complications for colorectal surgery. Despite the strong evidence in favor of not using bowel preparation for colorectal surgery, we believe that in some cases of sub-occlusive/obstructed left colorectal tumors the bowel prep can demonstrate benefits. Since the description of an intraoperative bowel preparation technique (IOBP), warm saline solution (0.9% PS) is mostly used, but it is associated with bowel wall swelling due to osmotic factors and the great volumes of that are often required. Furthermore this approach may lead to electrolyte imbalance, hypothermia and risk of bacterial

translocation. However changing the solution from saline to a more osmotic one can prevent the most of these factors against this procedure that we consider very useful for select cases yet.

**Methods/Interventions:** This is a prospective cohort study from Jul/2013 to Jan/2015. Fifteen patients, who were diagnosed with sub-occlusive/obstructive colorectal tumors, were considered eligible for radical resection, intraoperative bowel preparation (IOBP) and primary anastomosis. We used a solution composed of the combination of 2.7% sorbitol and 0.5% mannitol (SM) to perform the IOBP.

**Results/Outcome(s):** Twelve males and 3 females with a mean age of 57 years were submitted to the IOBP procedure. The median anesthetic and surgical time was 240min (150-432), including cases with extended resection. The median volume of solution needed was 1500ml (600-3000ml). Intestinal transit recovery was present on a median of 3 days after the surgery. Minor surgical complications happened in three patients: wound infection (n=2) and intracavitary abscess (n=1). None anastomotic leak had occurred, and mortality rate was 0%.

**Conclusions/Discussion:** The use of SM was a reliable alternative to IOBP, being effective with low volume, preparation time and low morbidity rates. It was capable to avoid Hartman procedures and leak events in high risk patients with obstructive colorectal tumors.

### ARE ORAL ANTIBIOTICS NEEDED IN PATIENTS UNDERGOING BOWEL RESECTION WITH END STOMA CREATION?

P732

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**Purpose/Background:** The role of preoperative antibiotics in reducing surgical site infection in colorectal surgery has been established. However, the role of preoperative antibiotics in patients who have an elective formation of end colostomy or ileostomy has not been clearly evaluated. The purpose of this study is to evaluate outcomes of patients receiving preoperative oral antibiotics with mechanical bowel prep before the creation of colostomy and ileostomy and evaluate the incidence of surgical site infections and Clostridium Difficile infections.

**Methods/Interventions:** The Michigan Surgical Quality Collaborative database was queried for patients who had elective end colostomy and end ileostomy after colectomy between 2012 and 2016. Operations included both minimally invasive and open colorectal resections. Patients were compared between those who had oral antibiotics ordered as part of their preoperative bowel preparation and those who did not. Outcomes examined included postoperative superficial surgical site infection, deep surgical site infection, organ space infection and Clostridium Difficile



infection. Pearson's Chi-squared test was used to compare outcomes between the two groups.

**Results/Outcome(s):** There were 2719 patients included, of which 2591 patients (95.29%) had end colostomy formation and 128 patients (4.71%) who had end ileostomy. The data on prescription or absence of prescription of oral antibiotics with bowel preparation was available in 335 patients (12.32%) only. Patients who had oral antibiotics with bowel preparation had lower superficial and surgical site infection (6.69% vs 4.43%,  $p=0.50$ ) deep space infection (1.64% vs 0.49%,  $p=0.316$ ) but without statistical significance. The incidence of organ space infection was lower in the non-antibiotic group (2.75% vs 2.96%,  $p=0.54$ ). The incidence of Clostridium Difficile infection was lower in the antibiotic group (2.21% vs 0.49%,  $p=.16$ ) but again statistical significance was not achieved.

**Conclusions/Discussion:** Use of antibiotics along with bowel preparation in patients who had colorectal procedures with end colostomy or ileostomy does not appear to influence postoperative surgical site infection or Clostridium Difficile incidence. It does not have the same benefit in reducing surgical site infection in patients undergoing bowel anastomosis, and may not be needed in this patient group.

#### LAPAROSCOPIC VERSUS OPEN COLECTOMY IN AMERICAN SOCIETY OF ANESTHESIOLOGISTS (ASA) CLASS IV PATIENTS: DOES THE LAPAROSCOPIC APPROACH CONFER BETTER OUTCOMES?

P733

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**Purpose/Background:** For patients with multiple life-threatening comorbidities undergoing colectomy, an open operative approach seems to be utilized more frequently than laparoscopy. Our objective was to examine the perioperative outcomes between laparoscopic and open colectomy in ASA physical status classification IV (ASA IV) individuals. We utilized a national clinical database to examine current trends in operative approaches for patients undergoing colectomy and the subsequent effects on perioperative outcomes.

**Methods/Interventions:** Utilizing the 2010-2014 American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) database, we examined ASA IV patients to evaluate the difference between laparoscopic versus open colectomy. Multivariate analyses were performed for major and minor perioperative outcomes while adjusting for patient characteristics, comorbidities, and type of operation performed.

**Results/Outcome(s):** A total of 20,751 ASA IV patients undergoing colectomy were identified, of which

3,820 patients (18%) underwent laparoscopic surgery. A steady increase in the usage of laparoscopic approach from the year 2010 (12%) to 2014 (22%) was observed. Patients who underwent laparoscopic surgery were older, tended to be male, were more likely to be diabetic, not be on dialysis or corticosteroids, not have cancer, and the cases were more often clean-contaminated. Multivariate analysis (Table 1) showed that most patient outcomes were significantly better for the laparoscopic approach, including mortality (aOR=0.47,  $p<0.001$ ), reoperation (aOR=0.65,  $p<0.001$ ), septic shock (aOR=0.47,  $p<0.001$ ), sepsis (aOR=0.63,  $p<0.001$ ), and surgical site infection (aOR=0.54,  $p<0.001$ ). The laparoscopic approach was associated with a shorter length of stay (-2 days,  $p<0.001$ ) and shorter operation to discharge time (-2 days,  $p<0.001$ ), although operating room time was prolonged (10 minutes,  $p<0.001$ ).

**Conclusions/Discussion:** Based on analysis of the ACS NSQIP database, laparoscopic approach confers better outcomes compared to open approach in ASA IV patients. The results of this study lend support for utilizing a laparoscopic approach in ASA IV patients undergoing colectomy.

#### THE ROLE OF BOWEL PREPARATION IN COLORECTAL SURGERY: RESULTS OF THE 2012-2015 ACS-NSQIP DATA.

P735

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**Purpose/Background:** Despite literature suggesting that mechanical bowel preparation (MBP) does not reduce infection rate, its use still remains common practice. The use of antibiotic bowel preparation (ABP) has shown more promise in the literature but is still not a standard practice. We hypothesize that there is a significant benefit with regards to infectious complications with the use of both mechanical and antibiotic preparation in elective colorectal resections.

**Methods/Interventions:** Patients undergoing elective colon or rectum resection included in the 2012-2015 Colectomy Procedure-Targeted databases from the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) were analyzed. These patients were grouped based on use of ABP, MBP, both, or no bowel preparation. Statistical analysis was performed to determine the association between preparation type and 30-day procedural outcomes. Patients undergoing emergent operation, with known infection prior to surgery, requiring ventilation preoperatively, having concomitant ostomy creation at the time of their colectomy or ASA class 5 were excluded from the study.

**Results/Outcome(s):** 12,141 women mean age (61.8±14) and 11290 men (60.5±14)(p<0.001) were included. 6050 received no preparation, 7111 received MBP only, 1010 received ABP, and 9534 received both MBP and ABP. Compared to patients receiving no preparation, those receiving MBP with ABP had lower rates of superficial SSI (5.83% vs 2.40%,  $P < .0001$ ), deep SSI (1.06% vs 0.48%,  $P < .0001$ ), organ space infection (4.53% vs 2.45%,  $P < .0001$ ), and wound dehiscence (0.83% vs 0.39%,  $P = .0003$ ). Compared to mechanical bowel preparation alone, combined preparation resulted in fewer instances of superficial wound infection ( $P < .0001$ ), deep wound infection ( $P = .0126$ ), organ space infection ( $P < .0001$ ), and wound dehiscence ( $P = .0074$ ). Oral antibiotic preparation alone resulted in lower rates of superficial wound infection than no preparation (4.26% vs 5.83%,  $P = .0437$ ) but no other significantly different outcome. MBP was no better than no prep. When looking at the effect of bowel prep by location we found that MBP with ABP we the best for both colon and rectal surgery but MPB alone reduced organ space infection in the colon group (Table1.)

**Conclusions/Discussion:** Combined mechanical and oral antibiotic bowel preparation resulted in significantly lower rates of SSI, organ space infection, and wound dehiscence than no preparation or mechanical preparation alone. Mechanical preparation alone showed no significant benefit. For patients undergoing colon or rectal resection we recommend bowel preparation with both mechanical agents and oral antibiotics.

	Superficial SSI	Deep SSI	Organ Space Infection	Dehiscence
<b>All patients</b>				
Dual prep vs MBP	2.40% vs 5.25% **	0.48% vs 0.79% *	2.45% vs 3.99% **	0.39% vs 0.69% *
Dual prep vs ABP	2.40% vs 4.26% *	0.48% vs 0.50%	2.45% vs 3.27%	0.39% vs 0.59%
Dual prep vs No Prep	2.40% vs 5.83% **	0.48% vs 1.06% **	2.45% vs 4.53% **	0.39% vs 0.83% *
MBP vs No Prep	5.25% vs 5.83%	0.79% vs 1.06%	3.99% vs 4.53%	0.69% vs 0.83%
ABP vs No Prep	4.26% vs 5.83% *	0.50% vs 1.06%	3.27% vs 4.53%	0.59% vs 0.83%
<b>Colectomy Only</b>				
Dual prep vs MBP	2.19% vs 5.16% **	0.52% vs 0.83% *	2.22% vs 3.37% **	0.44% vs 0.74%
Dual prep vs ABP	2.19% vs 3.94% *	0.52% vs 0.54%	2.22% vs 3.53% *	0.44% vs 0.68%
Dual prep vs No Prep	2.19% vs 5.84% **	0.52% vs 1.16% *	2.22% vs 4.31% **	0.44% vs 0.81% *
MBP vs No Prep	5.16% vs 5.84%	0.83% vs 1.16%	3.37% vs 4.31% *	0.74% vs 0.81%
ABP vs No Prep	3.94% vs 5.84% *	0.54% vs 1.16%	3.53% vs 4.31%	0.68% vs 0.81%
<b>Proctectomy Only</b>				
Dual prep vs MBP	2.79% vs 5.40% **	0.41% vs 0.72%	2.87% vs 5.13% **	0.30% vs 0.60%
Dual prep vs ABP	2.79% vs 5.13% *	0.41% vs 0.36%	2.87% vs 2.55%	0.30% vs 0.36%
Dual prep vs No Prep	2.79% vs 5.81% **	0.41% vs 0.74%	2.87% vs 5.20% **	0.30% vs 0.88% *
MBP vs No Prep	5.40% vs 5.81%	0.72% vs 0.74%	5.13% vs 5.20%	0.60% vs 0.88%
ABP vs No Prep	5.13% vs 5.81%	0.36% vs 0.74%	2.55% vs 5.20%	0.36% vs 0.88%

Table 1. Comparison of bowel preparation effects on infectious complications.  
\* -  $P < .05$   
\*\* -  $P < .0001$

**PARTIAL WOUND CLOSURE IN NON-TRAUMATIC COLORECTAL SURGERY: AN ANALYSIS OF ACS-NSQIP 2014-2015 DATA.**

P736

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**Purpose/Background:** Surgical site infections (SSI) are the most frequent type of nosocomial infection in surgical patients. Colectomy patients have been shown to be at an increased risk for SSI compared to other abdominal surgical patients. Literature from trauma surgery and perforated appendicitis cases have shown that closing only the deep layers (fascia) and leaving the superficial (skin) wound open results in a lower rate of SSI and dehiscence. We hypothesized that this same benefit will be seen in elective colorectal surgery patients.

**P733 Table 1. Multivariate analysis of ASA IV patient categorical outcomes comparing laparoscopic and open colon surgical approaches while adjusting for age, female, emergency, diabetes, smoke, steroid, cancer, small bowel involvement, and wound class.**

Outcome	Lap vs. Open aOR* (95% CI)	P-Value
Mortality	0.47 (0.40 - 0.54)	<0.001
Reoperation	0.65 (0.56 - 0.75)	<0.001
Septic Shock	0.47 (0.39 - 0.55)	<0.001
Sepsis	0.63 (0.54 - 0.74)	<0.001
Hemorrhage	0.47 (0.43 - 0.52)	<0.001
Surgical Site Infection	0.54 (0.47 - 0.62)	<0.001
Wound Disruption	0.42 (0.30-0.58)	<0.001
MI	0.75 (0.56 - 0.99)	0.045
Pneumonia	0.58 (0.50 - 0.67)	<0.001
DVT	0.62 (0.48 - 0.80)	<0.001
Pulmonary Embolism	0.77 (0.52 - 1.14)	0.193
Ventilator > 48h	0.38 (0.33 - 0.44)	<0.001
Acute Renal Failure	0.53 (0.40 - 0.71)	<0.001
Renal Insufficiency	0.84 (0.61 - 1.14)	0.260
Urinary Tract Infection	0.60 (0.50 - 0.73)	<0.001
Stroke/CVA	0.78 (0.51 - 1.21)	0.271

**Methods/Interventions:** Patients were selected from the 2014-2015 Colectomy Procedure-Targeted databases from the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP). Patients undergoing non-emergent colon or rectum resection without ostomy creation were included. These patients grouped based on degree of wound closure, all layers vs. deep layers only. Patients who had no surgical closure were excluded from the study. Patients with wound infection, organ space infection, UTI, pneumonia, or sepsis at the time of surgery were also excluded. Analysis was performed to determine the association between level of wound closure and 30-day procedural outcomes.

**Results/Outcome(s):** A total of 27577 patients were included in this study. 27295 had all layers of their wound closed and 282 had deep layers closed only. Compared to patients who had all layers closed, those who had their skin left open were younger, more likely to smoke, be on steroids at the time of surgery and had a higher ASA class. They also had a higher BMI, lower prealbumin, higher WBC, lower HCT and had a longer LOS. As expected the group whose skin was left open had a lower rate of superficial SSI (4.72% vs 1.06%,  $P = 0.0038$ ). Despite leaving the skin open there were no significant differences between rates of deep incisional infection, organ space infection, dehiscence, or anastomotic leak.

**Conclusions/Discussion:** Unsurprisingly, leaving a patient's skin incision open after colectomy for non-traumatic indications results in a lower rate of superficial wound infection. Unlike in trauma patients, however, this partial wound closure does not result in lower rates of wound dehiscence and does not result in fewer deep incisional or organ space infection. The associated morbidity of an open wound may outweigh any benefit. Based on these results we cannot recommend leaving the skin open except in the highest risk patients.

#### DAY-CASE ROBOTIC-ASSISTED VENTRAL RECTOPEXY IS FEASIBLE BUT MORE EXPENSIVE AND TIME CONSUMING THAN DAY-CASE LAPAROSCOPIC VENTRAL RECTOPEXY.

P737

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**Purpose/Background:** Ventral rectopexy to the promontory has become one of the most advocated surgical treatments for patients with full-thickness rectal prolapse and deep enterocele. Despite its challenges, laparoscopic ventral rectopexy with or without robotic assistance for selected patients can be performed with relatively minimal trauma for the patient thus creating the potential for same-day discharge. The aim of this prospective case-controlled study was to assess the feasibility, safety, and cost

of day-case robotic-assisted laparoscopic ventral rectopexy compared to routine day-case laparoscopic ventral rectopexy.

**Methods/Interventions:** Between November 28th 2011 and June 6<sup>th</sup> 2016, 71 patients underwent day-case laparoscopic ventral rectopexy for total rectal prolapse or deep enterocele in our institution. Patients were selected for day-case surgery on the basis of motivation, favorable social circumstances, and general fitness. Robotic assisted surgery was performed whenever robotic device was available ( $n=13$ ).

**Results/Outcome(s):** Patients from both groups were comparable in terms of demographics and technical results. Median hospital length of stay (10.8 vs 10.3 hours,  $p=0.89$ ), failure of ambulatory setting (2 vs 3,  $p=0.22$ ) and median maximal pain at day1 (2 vs 2,  $p=0.71$ ) were similar in the laparoscopic group and the robotic assisted group. Robotic-assisted laparoscopic rectopexy showed longer median operative time (96min vs 60 min,  $p<0.001$ ) and higher costs (9,088 vs 3,729 euros per procedure,  $p<0.001$ ) than laparoscopic rectopexy.

**Conclusions/Discussion:** Day-case robotic-assisted laparoscopic ventral rectopexy is feasible and safe, but results in increased operative time and higher costs than classical laparoscopic ventral rectopexy for full-thickness rectal prolapse and enterocele. We found no arguments to support the routine use of robotic assistance in rectopexy operations.

#### LAPAROSCOPIC VENTRAL RECTOPEXY FOR RECTAL PROLAPSE AND RECTAL INTUSSUSCEPTION USING A BIOLOGICAL MESH.

P738

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**Purpose/Background:** Laparoscopic ventral rectopexy (LVR) is a nerve sparing technique for the treatment of rectal prolapse. Concerns about the use of synthetic meshes in the pelvis and the associated risk of erosion have lead to the recent use of biological meshes in some colorectal units. This retrospective study aims to assess the outcomes of patients undergoing LVR using a non-cross-linked non-dermal biological mesh.

**Methods/Interventions:** Medical notes of all patients who underwent LVR between December 2011 and May 2014 were reviewed. The rate of obstructed defecation before surgery was retrospectively determined from medical records using the Rome III criteria. The rates of obstructed defecation and faecal incontinence following surgery were determined using a self-reported questionnaire.

**Results/Outcome(s):** A total of 51 patients had LVR between December 2011 and May 2014. Mean age was  $57.3 \pm 2.5$  years and mean follow-up was  $23 \pm 1$  month.

There were seven post-operative complications (13.7%). In total, 45 patients (88%) completed the functional outcome questionnaires. Before surgery, 33 patients (73.3%) complained of symptoms of obstructed defecation. At the end of follow-up, 22 patients (48.8%,  $P=0.001$ ) continued to have some symptoms of obstructed defecation. Before surgery, 12 patients (26.7%) complained of faecal incontinence. At the end of follow-up, only 3 patients (6.7%,  $P=0.004$ ) reported faecal incontinence. At the end of follow-up, recurrence of symptoms occurred in 6 patients (13.3%).

**Conclusions/Discussion:** LVR using a biological mesh is safe and results in significant reduction in symptoms associated with external rectal prolapse and rectal intussusception.

### SURGICAL MANAGEMENT OF RECTAL PROLAPSE: A CROSS-SECTIONAL PERSPECTIVE.

P739

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**Purpose/Background:** Rectal prolapse presents with a constellation of symptoms which can impact on patient lifestyle. Significant equipoise exists amongst the surgical community with regards to the diagnosis of internal rectal prolapse and its management.

**Methods/Interventions:** To demonstrate that the management of patients with rectal prolapse is far from standardized and that there is uncertainty in the decision making in rectal prolapse treatment. A prospective survey to assess practices was mailed to colorectal surgeons in Australia and New Zealand. The survey was divided into sections on surgeon demographics, patient evaluation, clinical scenarios with varied patient morbidity and preferred surgical approach, and finally a section on complications and follow-up.

**Results/Outcome(s):** The results of this study illustrate that as in other countries, the management of patients with rectal prolapse is far from standardized. Most controversy appears to be associated with the significance of the different grades of internal rectal prolapse versus external rectal prolapse and then its subsequent management. It was also noted that treatment preferences varied when comparing senior with junior colorectal surgeons.

**Conclusions/Discussion:** This survey affirmed that the management of patients with rectal prolapse is far from standardized and that there is uncertainty in the decision making in rectal prolapse treatment. By shedding more light on the debate amongst surgeons, this survey demonstrates the need for further more prospective studies to be conducted to aide in the development of guidelines.

### ADDED VALUE OF DYNAMIC MAGNETIC RESONANCE IMAGING OF THE PELVIC FLOOR (DMRIPF) IN PATIENTS WITH SUSPECTED PELVIC FLOOR DISORDERS. A CASE-SERIES IN A COLORECTAL UNIT OF A TERTIARY UNIVERSITY HOSPITAL.

P740

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**Purpose/Background:** Dynamic magnetic resonance imaging of the pelvic floor (DMRIPF) using ultrafast T2-weighted sagittal magnetic resonance imaging provides anatomical and functional data of all pelvic compartments in a single study and allows the detection of sub-clinical defects within the assessment of compartmental interaction during provocative maneuvers. The aim of the study was to evaluate the added value of DMRIPF in patients with suspected pelvic floor disorders from a coloproctology practice at a tertiary university hospital

**Methods/Interventions:** We present a prospective consecutive series of patients who underwent DMRIPF at our institution for suspected pelvic floor disorders between April 2005 and June 2016. Two independent observers reviewed DMRIPF results.

**Results/Outcome(s):** We recruited 335 cases (94.93% females). Mean age was 53.95 years (SD 11.8). DMRIPF was indicated in 299 patients (89%) due to outlet obstruction syndrome. Most of the patients ( $n=266$ , 79.4%), had only one diagnosis by clinical examination while 10.45% had 2, and 1.19% had 3. Anterior rectocele (AR) was the most common isolated diagnosis by physical examination ( $n=231$ , 68%) and was associated with other pelvic floor pathologies in 13.8%, being cystocele the most frequent (37%). Displacements of abdominopelvic structures that were missed by physical examination were found in 190 patients (56.72%). DMRIPF confirmed results of physical exam in 61 patients (18.21%) and modified diagnosis in 54 (16.12%). Added value of DMRIPF was more frequent in patients with AR at physical examination (63 vs. 31%,  $p < 0.001$ ). Female gender was also associated with a greater diagnostic yield (58.81% vs. 17.65%,  $p < 0.001$ ), while age was not. The median number of pathologies detected by physical exam was 1 (1-2), while post-DMRIPF was 3 (1-5). After DMRIPF, anterior rectocele as an isolated condition was found in 18.5%, whereas in 81.5% it was associated with up to 5 other pelvic floor disorders. Cystocele was associated to anterior rectocele in 53.7% of patients. DMRIPF added a diagnosis to physical examination in a further 50% of cases.

**Conclusions/Discussion:** To our knowledge this is the largest diagnostic case series presented. DMRIPF allows a more accurate simultaneous viewing of the anatomic components of the pelvic floor, inter-compartmental interactions and the functional dynamic interchange of visceral,

muscular and ligamentous structures during rest, squeeze and straining. It adds diagnostic value to physical examination allowing the detection of multi-compartment defects that otherwise may pass undetected. Diagnostic yield was higher in women than in men. The multiplanar real-time assessment of the pelvic floor as a functional unit by DMRIPF, represents an ideal tool for multidisciplinary treatment concept, and has a significant added value.

#### RELATIONSHIP BETWEEN RADIOLOGICAL IMAGING OF RECTOCELE AND OBSTRUCTED DEFECATION SYNDROME SYMPTOMS.

P741

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**Purpose/Background:** Several classification about rectocele are reported in literature but there is not any correlation between the type and the symptoms referred by the patients. Because of the lack of a classification with an impact on clinical evaluation, the present study aims to analyse the relationship between radiological features of rectocele and symptoms of obstructed defecation syndrome (ODS).

**Methods/Interventions:** All the patients undergone surgical treatment for ODS related to rectocele between January 2015 and March 2016 were included in the study. Preoperative imaging was performed through Dinamic Magnetic Resonance or Rx-Defecography identifying two morphological types of rectocele: L and Lambda. The dimension was determined measuring the distance between the apex of rectocele and the axis of the anorectal junction. Altomare ODS score was used to evaluate clinical presentation and symptoms. ANOVA and Pearson test were used to evaluate the correlation between Mellgren classification of rectocele and ODS score, while Fisher test was used to analysed the relationship between the new morphological classification and different items of ODS score.

**Results/Outcome(s):** 44 female patients were included. Rectocele was associated with other anatomical alteration such as rectal intussusception (43), enterocele (14), sigmoidocele (4), cystocele (7), colpocele (11). 33 patients have "L rectocele" and 11 patients have "Lambda rectocele". 32 of the 33 patients with "L rectocele" needed digitation: 26 vaginal, 3 anal and 3 perineal. 11 patients with "Lambda rectocele" referred vaginal (1) and perineal (10) digitation. Statistical analysis didn't show any significant correlation between rectocele dimension and ODS score, while Fisher test showed significant correlation between "L rectocele" and vaginal digitation and "Lambda rectocele" and perineal digitation.

**Conclusions/Discussion:** Rectocele is a common anatomic alteration whose identification does not determine a surgical indication. The basis for surgery are ODS

symptoms and among these, digitation is fairly troublesome. This new classification shows how the symptoms are related to a particular shape of rectocele and it can be thought as a complementary and useful tool to support surgical indication.

#### INTERNAL DELORME PROCEDURE FOR TREATMENT OF ODS ASSOCIATED WITH IMPAIRED ANAL CONTINENCE.

P742

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**Purpose/Background:** The aim of the present study is to evaluate the medium-term outcomes of internal Delorme procedure for treatment of obstructed defecation syndrome (ODS) associated with impaired anal continence.

**Methods/Interventions:** All patients undergone internal Delorme procedure for the treatment of ODS due to rectocele and/or internal rectal prolapse between January 2011 and February 2015 were retrospectively reviewed. Forty-one patients were included and they were divided into 3 groups according to associated symptoms of impaired continence such as urgency, passive fecal incontinence and both urgency and passive fecal incontinence. Patients with active anal incontinence were excluded. Preoperative status, perioperative complications and postoperative outcomes were investigated. Data were collected from standardized questionnaires such as Altomare ODS score, fecal incontinence severity index (FISI), and Patient Assessment of Constipation-Quality of Life Questionnaire (PAC-QoL). All groups of normally distributed data were expressed as mean  $\pm$  SD, followed by the paired t-test. For abnormal distributed data, Wilcoxon's signed-rank test was applied. All results with two-tailed  $< 0.05$  were considered statistically significant.

**Results/Outcome(s):** At a mean follow-up of 3 years, there were significant improvements ( $P < 0.01$ ) of the Altomare ODS score in all three groups of patients. In urgency group, the symptom of impaired continence disappeared in 17 (80.9%) of 21 patients ( $P < 0.01$ ). Similarly, there were significant improvements ( $P < 0.01$ ) of FISI in 11 (78.6%) of 14 patients in passive fecal incontinence group. However, only 1 (16.7%) of 6 patients with both urgency and passive fecal incontinence became continent after operation ( $P > 0.05$ ). The postoperative satisfaction grade of patients was excellent in 20 (49%), good in 9 (22%), fair in 5 (12%), and poor in 7 (17%). No major perioperative and postoperative complications occurred.

**Conclusions/Discussion:** ODS associated with impaired anal continence is a rare functional disorder but fairly challenging for the surgeon. Internal Delorme procedure results to be effective and a valid surgical options to treat this combination of functional disorders with an

improvement of obstructed defecation symptoms and continence without major morbidity. However, it seems to be less effective to improve the impaired continence symptoms in patients which have both urgency and passive fecal incontinence preoperatively.

#### CLINICAL AND PHYSIOLOGIC DIFFERENCE OF PELVIC FLOOR DYSFUNCTION IN KOREAN FEMALE POPULATION ACCORDING TO PARITY AND MODE OF DELIVERY.

P743

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**Purpose/Background:** There are very few study about development of obstructed defecation and constipation after parity and mode of delivery. The purpose of this study was to evaluate the prevalence of pelvic floor disorders and anal, urinary incontinence in korean women according to parity and mode of delivery. And also we evaluated the clinical and physiologic difference of pelvic floor disorder after biofeedback treatment in Korean parity women.

**Methods/Interventions:** From January 2011 to December 2015, total 160 female patients were studied who visited Hwamyong Jangsiwon colorectal Surgery clinic. Among these patients 80 women had history of pregnancy, and the other 80 patients had no history of pregnancy or delivery. And we divided the patients into Group A(History of pregnancy and delivery) and Group B(No history of pregnancy and delivery). And we also divided the Group A patients according to mode of delivery(Group C; normal dilivery, Group D; Cesarean section Group E; Cesarean section after hard labor) and we evaluated patients if she had fecal incontinence, urinary incontinence, history of constipation, defecation difficulty, IBS symptom, stool caliber, residual stool symptom according to mode of delivery. After treatment we also evaluated the defecation disorder patients with a questionnaire.

**Results/Outcome(s):** The mean age of all patients was 37. The mean age of Group A was 51 and the mean age of Group B was 23. There were more frequent of fecal incontinence, urinary incontinence, IBS, history of constipation, hard stool caliber, in Group A than Group B patients. There were significant frequent of positive defecation disorder result in Group A than Group B and more frequent positive defecation disorder result in Group C than Group D. There were more frequent of urinary incontinence in Group C than Group D and more frequent of fecal incontinence and IBS symptom in Group E than Group D patients. According to number of delivery there were more frequent hard stool and constipation symptom in more than 3 delivery than less than 2 delivery Group and more frequent IBS symptom in less than 2 delivery Group. According to hard labor of delivery there were more frequent fecal incontinence than other delivery patients

There were more decreased anal resting, squeezing, push and more increased 1<sup>st</sup> sensation and capacity in Group A than Group B patients. And more decreased anal resting, squeezing, push pressure and increased 1<sup>st</sup> sensation and capacity in Group C than Group D patients

**Conclusions/Discussion:** We should consider, there is significant relationship between pelvic floor dysfunction with constipation and vaginal delivery and parity and there is relationship between anorectal and urinary incontinence and vaginal delivery and parity. So. more defined randomized longitudinal study should be carry out about pelvic floor function and delivery.

#### COST-EFFECTIVENESS ANALYSIS COMPARING SACRAL NEUROMODULATION AND SPHINCTEROPLASTY IN TREATING FECAL INCONTINENCE.

P744

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*Cambridge, MA; Boston, MA*

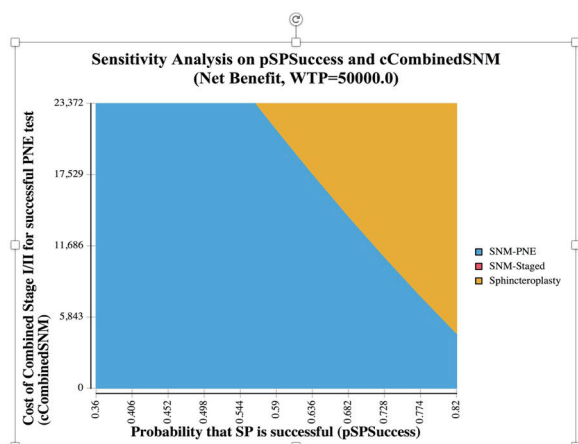
**Purpose/Background:** While sphincteroplasty (SP) is a mainstay in treating fecal incontinence (FI) due to anal sphincter defects (ASD), its long-term effectiveness has been questioned. Sacral neuromodulation (SNM) was FDA-approved for treating FI in 2011, but trials have been limited to refractory FI after SP or neurogenic FI. Retrospective data indicate that SNM may have promise as a primary treatment for FI with ASD. In the absence of comparative clinical trial data, a decision-analysis model can be used to compare SP to SNM. The aim of this study is to compare the cost-effectiveness of SP with two methods of SNM, staged implantation (SNM-St) and peripheral nerve evaluation (SNM-PNE).

**Methods/Interventions:** The study was exempt from review board oversight. We constructed a decision-tree using available software (TreeAge Pro 2016, Williamstown, MA) to compare SP to SNM-St and SNM-PNE. Each branch included the possibility of failure and complications. SP failures could be further managed with SNM and vice versa. All failures had the option of declining further management. We used a time horizon of 4 years in order to match both the lifespan of the SNM battery and the data available on SNM and SP outcomes. Outcome probabilities and healthy-state utilities were obtained from published studies. Weighted means were calculated where necessary. We considered 6 health states related to refractory and cured FI, with and without treatment complications. We estimated surgical costs, in 2016 U.S. dollars, of each treatment and equipment using Medicare fee schedules for appropriate *Current Procedural Terminology* (CPT-4) codes and *Diagnosis Related Group* (DRG) codes. Costs were from the health-care perspective and were discounted at a standard rate of 3%. Cost-effectiveness for the base-case analysis was reported as cost per quality-adjusted

life year (QALY). Threshold analysis was performed to identify factors which significantly influenced the outcome. Probabilistic sensitivity analysis was performed to test the robustness of our model and determine preferred strategies for willingness-to-pay thresholds.

**Results/Outcome(s):** In the base-case analysis, where the mean probability of successful SP was 65%, SP was most cost-effective strategy at \$5263/QALY followed by SNM-PNE at \$6090/QALY. In a two-way threshold analysis (Figure 1), if either the success of SP was < 55% or the cost of SNM-PNE was < \$16,500, then SNM-PNE became most cost-effective. Staged SNM was not cost effective at these thresholds. At willingness-to-pay thresholds of \$50000 and \$100000, SP was the most cost-effective strategy.

**Conclusions/Discussion:** The cost-effectiveness for the treatment of FI with ASD is highly dependent on the long-term success of SP and the cost of SNM-PNE. Clinical studies defining and assessing the true long-term success rate of SNM for FI with anal sphincter defects and efforts to reduce the cost of SNM are needed.



Two-way sensitivity analysis: Effect of probability of SP success vs cost of SNM-PNE on preferred strategy

## COCCYGEAL HERNIA: A CASE SERIES AND LITERATURE REVIEW.

P745

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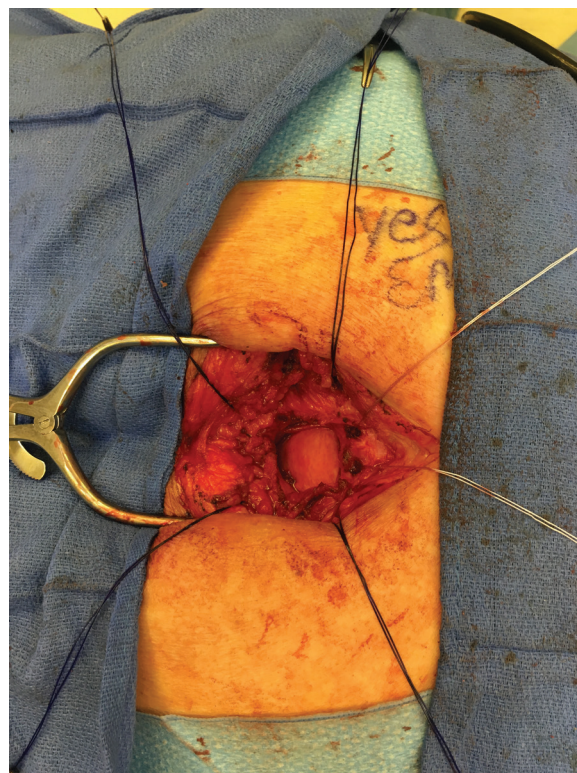
**Purpose/Background:** Coccygeal hernia is rare, with few articles in the literature discussing its evaluation and treatment. This reviews two successful cases of coccygeal hernia and the subsequent surgical management with mesh repair, as well as the available literature on the subject.

**Methods/Interventions:** A PubMed and Google Scholar web search were conducted and any articles relating to coccygeal hernia were identified. A bibliography review

of identified sources was used to further identify relevant sources. The electronic medical record for each of the patients involved was reviewed to include all relevant history, preoperative workup, operative management and post-operative course.

**Results/Outcome(s):** Both patients responded well to a posterior repair with mesh, with improvement of preoperative symptoms.

**Conclusions/Discussion:** Given the paucity of data on the subject, more data is required to determine the optimal management of patients who present with coccygeal hernia. This series offers support for the successful management of coccygeal hernia with a posterior approach and mesh repair.



Location of the mesh and suture placement.

## EVALUATION OF FAST-FILL ANAL ACOUSTIC REFLECTOMETRY: AN IMPROVED PHYSIOLOGICAL ASSESSMENT OF ANAL SPHINCTER MORPHOLOGY.

P746

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**Purpose/Background:** Anal Acoustic Reflectometry (AAR) has been shown to be a clinically useful, easy to perform, reproducible and repeatable method for measuring the physiological profile of the anal canal. It

has previously been undertaken using a stepwise method and has been shown to be primarily a measure of internal anal sphincter function. Evaluation of a new continuous (fast-fill) method, recently developed for the urethra, would enable its future application for investigation of rectal reflexes.

**Methods/Interventions:** Patients aged 18 and over with faecal incontinence (FI) were included. Each underwent AAR with both stepwise and fast-fill methods, with a two minute rest period between. Stepwise AAR measures parameters over a 3 minute period of intermittently increasing stretching and closing of the anal canal; the faster method measures these continuously over 14 seconds. Standard anorectal manometry and Vaizey FI score were also recorded. Pairwise comparison of Opening Pressure (Op,cmH2O), Opening Elastance (Oe,cmH2O/mm<sup>2</sup>), Closing Pressure (Cp,cmH2O), Closing Elastance (Ce,cmH2O/mm<sup>2</sup>), Hysteresis (Hys,(%)), Squeeze Opening Pressure (SqOp,cmH2O), Squeeze Opening Elastance (SqOe,cmH2O/mm<sup>2</sup>), Maximum Resting Pressure (MRP,cmH2O) and Maximum Squeeze Pressure (MSP,cmH2O) were performed using the Wilcoxon Signed Ranks test and Spearman correlations.

**Results/Outcome(s):** 32 patients, 26 female were analysed. Median age: 60 (range 32-75). Median Vaizey score was 15 (range 6-22). Median AAR parameters of Op (37.50 vs 35.15,  $p=0.031$ ), Oe (1.31 vs 0.84,  $p<0.0001$ ), Ce (1.11 vs 0.88,  $p<0.0001$ ), Hys (37.75 vs 19.04,  $p<0.0001$ ) and SqOe (1.27 vs 1.06,  $p=0.005$ ) were significantly higher with the fast-fill method. Cp (22.70 vs 27.22,  $p=0.003$ ) is lower and SqOp (96.87 vs 59.47,  $p=0.71$ ) was not significantly different. Correlation analysis found a significantly strong correlation of Op (0.91,  $p<0.0001$ ) and SqOp (0.91,  $p<0.0001$ ) between the two methods. Op significantly correlated with MRP (0.64  $p=0.0002$  (stepwise), 0.62  $p=0.62$  (fast-fill)) and SqOp had significant correlation with MSP (0.44,  $p<0.0001$ ). Fast-fill SqOp had a stronger negative correlation with Vaizey score than stepwise (-0.46,  $p=0.009$  vs -0.37,  $p=0.038$ ). MSP did not correlate with Vaizey score.

**Conclusions/Discussion:** A strong correlation is identified between the two methods, and we interpret the small difference in Op to be of little clinical significance. Elastance reflects the resistance of the anal canal to opening, and the ability of the tissues to close down after. Increased elastance with the fast-fill method is likely to represent the response of smooth muscle to the faster rate of stretch. We conclude this faster method to be valid, and that it may demonstrate a more physiological representation of anal sphincter function than the stepwise method.

## A NOVEL METHOD FOR THE MEASUREMENT OF THE RECTOANAL INHIBITORY REFLEX (RAIR) USING ANAL ACOUSTIC REFLECTOMETRY (AAR).

P747

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**Purpose/Background:** The recto-anal inhibitory reflex (RAIR) was first described in 1877 as the inhibition of the tonic contraction of the sphincters during rectal distension. This is currently measured using a manometry catheter, potentially distorting the anal canal. AAR is considered a catheter free technique which primarily measures internal anal sphincter function and previous studies have shown that the placement of a rectal balloon catheter has no significant effect on fast-fill AAR parameters. We sought to determine if the rectoanal inhibitory reflex (RAIR) could be measured using AAR.

**Methods/Interventions:** Patients aged 18 and over attending the hospital for investigation of pelvic floor dysfunction were included. Type of pelvic floor dysfunction, Vaizey score, Constipation Scoring System score (CSS) and Manchester Health Questionnaire (MHQ) score were recorded. Fast-fill AAR (Pre-RAIR) parameters were obtained before and after placement of a rectal balloon catheter. Opening Pressure (Op, cmH2O), Opening Elastance (Oe, cmH2O/mm<sup>2</sup>), Closing Pressure (Cp, cmH2O), Closing Elastance (Ce, cmH2O/mm<sup>2</sup>), Hysteresis (Hys, (%)) were recorded. After a two minute rest period, rectal distension was simulated by injection 100mls of air into the balloon and measurement of AAR parameters was repeated (post-RAIR). The minimum Op of the ten repeated cycles of fast-fill AAR during rectal distension was recorded, and the presence of RAIR defined by a reduction of Pre-RAIR Op by 20%. Pairwise comparisons were made using the paired t-test and Wilcoxon signed ranks test.

**Results/Outcome(s):** 32 patients were included, 26 female. Mean age: 57.6 (SD 11.3). 9 patients had faecal incontinence, 6 patients had obstructive defaecation and 17 patients had both. Mean Vaizey: 11.7 (SD 6.1), Mean CSS: 11.0 (SD 5.8) and MHQ: 419.6 (SD 201.8). RAIR was seen in 30/32 patients with median reduction of 61.36% (range -59.18 – 100%) in Op. 3 patients had a post-RAIR Op of 0cmH2O. Comparison of pre- and post-RAIR median (mean where normally distributed) AAR showed a significant difference in Op (31.05 vs 15.41,  $p<0.0001$ ), Oe (1.4 vs 1.09,  $p=0.004$ ), Cp (20.06 vs 8.00,  $p<0.0001$ ), and Ce (1.12 vs 0.85,  $p<0.0001$ ). There was no significant difference in Hys (39.48 vs 40.02,  $p=0.88$ ).

**Conclusions/Discussion:** We describe a novel method for the measurement of the rectoanal inhibitory reflex. It appears that rectal distension alters both resting pressure



and the resistance to opening and closing of the anal canal. In three patients, there was complete inhibition of the sphincter complex which may indicate a failure of recruitment of the external sphincter in these patients. A comparative study with asymptomatic patients could explore this technique further to evaluate differences between those with and without pelvic floor dysfunction.

#### **BARIUM DEFAECATING PROCTOGRAPHY: 5 YEAR EXPERIENCE WITH LONG TERM FOLLOW UP AT A TERTIARY HOSPITAL.**

P748

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**Purpose/Background:** It is estimated by 2050, 20% of the US and 28% of Europe's population will be aged over 65. Pelvic floor disorder (PFD) is harboured in an aging population. It impairs the quality of life and patients demand adequate treatment – often surgery. Barium defaecating proctography (BDP) is often performed for PFD. Little long term outcome information is available. We present the findings and long term outcomes following BDP.

**Methods/Interventions:** All patients who underwent BDP between 2009-14 were identified retrospectively from the computed radiological information system (CRIS). Demographic data and radiological findings were extracted. Data regarding treatment plan and surgery was retrieved from an anonymized centralised patient record registry for the West of Scotland (SAFE HAVEN).

**Results/Outcome(s):** Six hundred and seventy one patients were identified; 629 (94%) were female. Median age was 51 (range 16-88) years. Majority (74%) were Gynaecology referral. Main complaint was obstructed defaecation/chronic constipation (64%). Others included prolapse (n=74), soiling/incontinent or mixed symptom (n=76) and rectocele (n=21). Eighty three (12.4%) had previous surgery for PFD. Normal defaecation was seen in only 74 (11%). A third had low lying perineum while almost half (48%) had prominent pelvic floor descent. Complete barium evacuation was seen in the vast majority (70%) and dyssynergic defaecation was demonstrated in 162 (24%). Rectocele was present in 380 of which 67% were large or moderate. Enterocoele was demonstrated in 79 (11.8%) and frank prolapse in 32. Lesser degree of mucosa laxity was present in 82. Median follow up was 4 (range 2-7) years. A minority of patients underwent subsequent surgery, with most patients getting conservative management. Treatment ranged from physiotherapy, dietary advice, drug modulation to rectal irrigation.

**Conclusions/Discussion:** This is the largest series of barium proctography with long term follow up to our knowledge. It demonstrates disparate often unexpected radiological findings with low incidence of normal examinations. Variation exists between surgeons regarding treatment given any one set of findings. Treatment is often conservative with surgery reserved for a few.

#### **THE PREDICTION OF DEFECTION FUNCTION AFTER SPHINCTER SAVING SURGERY BY COLON TRANSIT TIME TEST USING KOLLOMARK AT THE TIME OF THE CLOSURE OF DIVERTING STOMA.**

P749

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**Purpose/Background:** Impaired functional outcome is common after sphincter saving surgery (SSS) in rectal cancer patients. Several risk factors have been suggested, but most risk factors are associated with the change within pelvic cavity such as sphincter anatomy and remnant distal rectal length. Although the change of colonic motility after SSS has been frequently mentioned, its effect on defecation function after SSS is not as well known. The aim of this study was to evaluate whether the colonic motility at the time of the closure of diverting stoma after SSS in rectal cancer patients may predict their defecation function after the closure of diverting stoma.

**Methods/Interventions:** From June 2013 to August 2015, 45 patients with the closure of diverting stoma after neoadjuvant chemoradiotherapy following SSS were enrolled in this study. Colonic transit time (CTT) test was started at the time that oral intake was resumed after surgery for the closure of diverting stoma, terminated at the time that any radio-opaque marker had not been visible on KUB. We evaluated patients' subjective symptom using Cleveland Clinic Incontinence Score (CCIS) at 6 months and 12 months after SSS.

**Results/Outcome(s):** The mean age was  $62.9 \pm 9.5$  years. The mean CCIS at 6 months and 12 months after SSS were  $10.3 \pm 4.9$  and  $8.9 \pm 4.6$ , respectively. The frequency of defecation for one day at 6 months and 12 months after SSS were  $8.6 \pm 4.3$  and  $7.7 \pm 5.2$ , respectively. The mean total CTT was  $52.5 \pm 27.6$  hours. Dividing according to location, the mean CTT of right side, left side, and pelvic side were  $43.8 \pm 23.5$  hours,  $7.2 \pm 6.3$  hours, and  $1.5 \pm 1.9$ , respectively. Patients with above 9 points of CCIS at 6 and 12 months after SSS had more rapid CTT of left side at the time of the closure of diverting stoma than those with 9 or less of CCIS ( $4.7 \pm 4.2$  vs  $8.9 \pm 7.1$  hours,  $P=0.026$  and  $5.0 \pm 5.4$  vs  $8.5 \pm 6.5$  hours,  $P=0.069$ ). On generalized linear

model for analysis of the relation between CCIS and CTT, the CTT of left side at the time of the closure of diverting stoma was significantly related to CCIS at 6 months after SSS ( $P=0.020$ ).

**Conclusions/Discussion:** Based on our result, CTT of the left side at the time of the closure of diverting stoma might be a good predictor of defecation function for next few months after the closure of the diverting stoma in rectal cancer patients.

#### TOILET POSTURE AND USE OF A FOOT STOOL: IMPLICATIONS FOR THE PELVIC FLOOR AND ANORECTAL ANGLE.

P750

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**Purpose/Background:** In the general population, 2% - 28% of people are affected by constipation. There has been an increase in inpatient admissions due to constipation in the United States leading to a rise in constipation related costs. A healthy bowel movement starts with the relaxation of the fibers that wrap around the rectum (puborectalis). Relaxation allows for descent of the pelvic floor and straightening of the anorectal angle. Chronic outlet constipation results if the anorectal angle is not able to straighten. Posture affects the anorectal angle. When squatting, compared to a typical seated position, the anorectal angle widens and the puborectalis muscles lengthen. The same effect can be observed in a seated position by a reduction in the angle between the pelvis and the thighs (Rad, 2002; Sakakibara, Tsunayama, Hosoi et al., 2010; Takano & Sands; 2015). However, westernized toilets do not allow for a full squatting position. The Squatty Potty™ foot stool (SP) was created with the intent of elevating the feet in a seated position, thus approximating a squatting position. Based on work by Sakakibara and colleagues (2010) the degree of flexion at the hip, with respect to the rest of the body allows us to infer the anorectal angle. It was predicted that height will influence the angle formed at the hips and the posterior pelvic tilt.

**Methods/Interventions:** Data were collected using a Vicon Motion Analysis system. Markers were placed on body landmarks to allow calculation of the angle formed at the hip and the amount of posterior pelvic tilt. Conditions tested were seating on a standard toilet (41-42 centimeters high) and a comfort toilet (43-48 centimeters high) without a foot stool, while using the 7 inch SP stool, and while using the 9 inch SP stool.

**Results/Outcome(s):** Preliminary results show that, as foot elevation increased (flat foot, 7in, and 9in), pelvic-hip angle decreased and posterior pelvic tilt increased. Taller subjects (>66.5in) achieved a smaller angle at the hips in all positions compared to shorter subjects (<66.5in). Shorter subjects achieved a larger amount of posterior pelvic tilt in all positions compared to taller subjects. These results show that body height has an effect on the body position formed when using a foot stool.

**Conclusions/Discussion:** Kinematic body position measures allow for inferences to be made on the anorectal angle and the relaxation of the pelvic floor. The SP stool may allow relaxation of the pelvic floor and straightening of the anorectal angle.

#### THE EFFECT OF BIOFEEDBACK THERAPY PERFORMED DURING INTERVAL OF TEMPORARY STOMA AFTER SPHINCTER SAVING SURGERY FOR RECTAL CANCER ON ANORECTAL FUNCTION AFTER REVERSAL OF TEMPORARY STOMA: THE FINAL REPORT OF RANDOMIZED CONTROLLED STUDY (NCT01661829).

P751

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**Purpose/Background:** Impaired functional outcome is common after sphincter saving surgery (SSS) for rectal cancer, though no specific treatment options are currently available to prevent this adverse outcome. Recently, some investigators have reported the favorable effect of pelvic floor rehabilitation on anorectal function. We intended to evaluate the effect of biofeedback therapy (BFT) during the interval of temporary stoma after SSS of rectal cancer on anorectal function after stoma closure.

**Methods/Interventions:** From March 2012 to February 2014, total 56 patients who underwent neoadjuvant chemoradiation therapy (nCRT) following SSS with temporary stoma were randomized into 2 groups: group 1 (received BFT during the temporary stoma period) and group 2 (did not receive BFT). We instructed Kegel exercise to all the patients from the moment that patients recovered from surgery. Additionally, BFT was performed two times a week during interval of temporary stoma in patients enrolled into group 1. To evaluate the anorectal function, we performed anorectal manometry at before nCRT (period 1), after nCRT (period 2), before the reversal of temporary stoma (period 3), 6 months after SSS (period 4), and 12 months after SSS (period 5). We evaluated

treatment response as the change rate of manometric data based on data in period 1 (manometric data in period 5/manometric data in period 1). Also, we evaluated patients' subjective symptom using Cleveland Clinic Incontinence Score (CCIS) at every period.

**Results/Outcome(s):** Total 44 patients, including 21 patients in group 1 and 23 patients in group 2 were evaluated by anorectal manometry at period 5. At period 5, mean daily defecation were  $7.7 \pm 4.9$  in group 1 and  $5.7 \pm 3.7$  in group 2 ( $P=0.139$ ). Twelve patients (57.1%) in group 1 and 14 patients (60.9%) in group 2 had an above 9 points of CCIS, which is reference value of fecal incontinence ( $p=1.000$ ). Fourteen patients (66.7%) in group 1 and 19 patients (82.6%) in group 2 used antidiarrheal drug at period 5 ( $P=0.303$ ). Most common defecation symptom

of patients in both group is an 'urgency to evacuate' (15 patients (75.0%) in group 1 and 14 patients (60.9%) in group 2,  $P=0.620$ ). Table shows the results in the change rate on all factors of manometry for sphincter tone and threshold volume.

**Conclusions/Discussion:** Based on above result, biofeedback therapy during interval of temporary stoma had no effect on preventing anorectal dysfunction after reversal of temporary stoma. At previous interim report, we demonstrated that BFT may be helpful for maintaining resting anal sphincter tone to the period 4. Therefore, we think that another BFT schedule like keeping the BFT after the closure of diverting stoma or other treatment option to be able to keep the advantage of BFT to the period 5 should be found.

**P751 The change rate of each factors of manometry in period 5**

The change of	Biofeedback therapy group	Kegel's Exercise group	P-value
Mean resting pressure	0.69	0.72	0.601
Maximal resting pressure	0.66	0.68	0.350
Maximal squeezing pressure	0.65	0.68	0.359
High pressure zone length in rest	1.28	1.57	0.186
High pressure zone length in squeezing	1.07	1.33	0.212
Maximal rectal sensory threshold	0.61	0.58	0.648
Rectal compliance	1.06	1.31	0.833

## VIDEO ABSTRACTS

### OVERLAPPING SPHINCTEROPLASTY AFTER EXCISION OF A BENIGN PERIANAL GRANULAR CELL TUMOR.

WV1

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**Purpose/Background:** The aim of this video is to demonstrate successful application of overlapping sphincteroplasty after excision of a rare benign granular cell tumor that was arising in and compromising 25% circumference of the external anal sphincter. This technique is an alternative to abdominoperineal resection for management of this symptomatic lesion.

**Methods/Interventions:** The patient is a 52 y/o woman with a history of one uncomplicated vaginal delivery. She had noted a perianal growth at the anal verge. Physical exam revealed a firm, immobile mass with indistinct borders. Biopsy was consistent with a granular cell tumor, which is a benign neoplasm of neural origin. The tumor had enlarged to greater than 4 cm over one year, with local mass effect causing new fecal leakage and anal pain. The patient desired an attempt at local excision. A step-by-step approach is presented in the video. Pre-operative endoanal ultrasound and intra-operative anatomical landmarks are shown.

**Results/Outcome(s):** Pathology was again consistent with a granular cell tumor. The deep margin was threatened, putting the patient at up to 20% risk for local recurrence. This will be followed with local surveillance. The patient notes poor discrimination but is able to defer for greater than one minute and denies gross fecal soilage.

**Conclusions/Discussion:** Local excision of a symptomatic but histologically benign tumor compromising 25% circumference of the external anal sphincter is possible with successful overlapping sphincteroplasty and preservation of gross fecal continence at 6 month follow up.

### COMBINED TRANSANAL AND TAMIS RESECTION OF A GIANT RECTAL ADENOMA.

WV2

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**Purpose/Background:** A 68 y.o. male presented with a large (10cm x 8cm) tubulovillous adenoma of the rectum, extending from 1cm above the sphincter to the mid/upper rectum. The lesion had a high grade dysplasia but no invasive cancer.

**Methods/Interventions:** A combined transanal and TAMIS resection was successfully performed. The video shows all the diagnostic and therapeutic steps, including the bleeding control and complete reconstruction in the patient with a favourable body habitus.

**Results/Outcome(s):** Complete resection and recovery were accomplished.

**Conclusions/Discussion:** Resection of a large (10cm) rectal adenoma is feasible via the transanal approach. TAMIS technique further enhances it.

### ENDOSCOPIC SUBMUCOSAL DISSECTION OF A LARGE, SESSILE CECAL LESION.

WV3

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**Purpose/Background:** Large, sessile lesions not amenable to traditional endoscopic resection pose a dilemma for colorectal surgeons. Endoscopic submucosal dissection is an advanced endoscopic technique that can potentially obviate the need for surgical resection of larger lesions. We present here a video describing this technique.

**Methods/Interventions:** Per video

**Results/Outcome(s):** Per video

**Conclusions/Discussion:** Per video

### REPAIR OF RECTO-VAGINAL FISTULA IN A TRANSGENDER PATIENT UTILIZING INTESTINAL VAGINOPLASTY.

WV4

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**Purpose/Background:** We wish to illustrate a case of recto-vaginal fistula in a transgender (male to female) patient who underwent neovagina creation with penile and scrotal skin inversion.

**Methods/Interventions:** After transabdominal and perineal removal of the penile and scrotal skin inversion neovagina as well as removal of all foreign bodies in the anterior mesorectal compartment, the anterior rectal fistula was identified and repaired. An intestinal vaginoplasty was performed using a conduit of proximal sigmoid colon and intestinal continuity was restored.

**Results/Outcome(s):** The patient underwent a successful procedures to cure the recto-vaginal fistula and to create a functional intestinal neovagina with a loop of proximal sigmoid colon. There was no complication associated with the procedure, no fistula recurrence and functional outcomes were adequate.

**Conclusions/Discussion:** Intestinal vaginoplasty is a technique that can be used after failed gender reassignment (male to female) surgery secondary to recto-vaginal fistula.

### TAMIS FOR EXCISION OF A RECURRENT RECTAL POLYP AT THE ANASTOMOTIC LINE FOLLOWING ANTERIOR RESECTION.

WV5

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**Purpose/Background:** TAMIS is now an accepted modality for local excision of benign and highly selected early stage rectal cancer. The use of this platform for excision of a recurrent benign neoplasm at the level of the anastomotic line has not been previously delineated.

**Methods/Interventions:** Two patients underwent TAMIS excision of recurrent, benign rectal neoplasia at the anastomotic line 24 months and 18 months after low anterior resection previously performed for endoscopically unresectable polyps; both were consented for redo laparoscopic low anterior resection in the event that TAMIS excision was not possible.

**Results/Outcome(s):** Local excision of recurrent benign rectal neoplasia on the distal aspect of the anastomosis was safely performed without peritoneal entry. In this video, two cases were demonstrated. In the first, a recurrent 3.8 cm carpeting benign neoplasm was excised using TAMIS. The lesion was 10 cm from the anal verge, in close juxtaposition with the prior anastomosis that was constructed after anterior resection for a tubulovillous adenoma. In the second example, the recurrent polyp (a sessile villous adenoma measuring 2.8 cm) involved the anastomotic line which was 7 cm from the anal verge. TAMIS was performed successfully to excise the lesions completely. Violation of the peritoneal cavity was not encountered and the defects were re-approximated using automated suturing devices and absorbable suture. Operative times were 58 min and 37 min for the two cases. Both patients were discharged on the day of TAMIS surgery. There was no operative or post-operative morbidity at 3 month follow up.

**Conclusions/Discussion:** In select cases, TAMIS excision of recurrent benign rectal neoplasia is feasible, safe, and can be performed without peritoneal entry. This technique is an important alternative to redo low anterior resection and thus prevents the inherent morbidity associated with reoperative pelvic surgery.

### MARTIUS FLAP FOR PERSISTENT, COMPLEX RECTOVAGINAL FISTULA.

WV6

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**Purpose/Background:** Rectovaginal fistula is a challenging problem for the patient and the surgeon. The Martius (bulbocavernosus muscle) flap technique is one of several options for repair of rectovaginal fistulas. This

video provides a detailed variation of the Martius flap to treat a complex and persistent rectovaginal fistula.

**Methods/Interventions:** We present a 61 year-old female who developed a rectovaginal fistula status post procedure for prolapsed hemorrhoids. She had previously undergone an endorectal advancement flap; however, this failed and she continued to pass feces vaginally. The fistula had two openings in the vagina and one in the rectum. We describe our technique and identify the key points to a successful repair of this complex rectovaginal fistula.

**Results/Outcome(s):** The patient did well after the Martius flap and has a better quality of life after the procedure.

**Conclusions/Discussion:** The Martius flap is an excellent option for complex, recurrent or persistent rectovaginal fistulas in patients who are not candidates for or have failed other repairs.

### EXTRALEVATOR ABDOMINOPERINEAL EXCISION (ELAPE) FOR LOW RECTAL CANCER: TIPS & TRICKS.

WV7

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**Purpose/Background:** Abdominoperineal excision has historically been the gold standard treatment for patients with low rectal cancer with sphincter invasion. Despite many technical modifications, local recurrence continues to be superior to that in anterior resection and is associated with a lower overall survival. Recently, extralevator abdominoperineal excision (ELAPE) has been proposed as a new surgical procedure to improve the quality of the specimen. The purpose of this video is to show the key anatomic steps of this procedure.

**Methods/Interventions:** A video was produced from an ELAPE procedure performed in a 38 year-old male patient with a low rectal cancer of the anterior wall, at 4 cm from the anal verge, invading the anorectal ring and the prostate, who had received neoadjuvant chemoradiotherapy (nCRT). After re-staging the patient with an MRI, the surgery was scheduled at 11 weeks after nCRT completion. Same team was involved in both approaches of the procedure: abdominal and perineal. The abdominal portion of the operation was performed laparoscopically, and after a terminal colostomy was performed, the patient was rotated to prone jack-knife position for the perineal approach.

**Results/Outcome(s):** This video stresses all the steps of the procedure. After the vascular control of the inferior mesenteric artery from a medial approach, the distal dissection ran through the plane of the mesorectal fascia as a standard total mesorectal excision. However, the dissection was stopped at the upper border of the coccyx posteriorly and just below the level of the seminal vesicles

anteriorly. A gauze was placed in the presacral space to facilitate the perineal dissection. At this time of the procedure, the colon was sectioned with an endoscopic stapler and the distal colorectal stump was rotated into the pelvis. Once an end colostomy and skin closure were performed, the patient was rotated to a prone jack-knife position. An anal cerclage was performed with a purse string suture and a teardrop incision was made around the perianal skin. The dissection started at the external border of the external sphincter. Once the levator ani muscles were reached, they were divided at their point of insertion in the pelvis. A coccygectomy was performed to obtain an increased surgical field and the gauze was removed. Part of the prostate was en bloc resected under a proper control as it was invaded by the tumor. Seminal vesicles were also correctly identified. The specimen was removed and the perineal defect was repaired with a slow absorbable mesh. Drainage was left in place above the mesh.

**Conclusions/Discussion:** The ELAPE procedure has many technical details. Systematization of the procedure allowed an optional intraoperative control of the tumor, decreasing the risk of tumor perforation and positive margins. The prone jack-knife position and the coccygectomy improves the surgical field and is especially useful in patients with tumors of the anterior rectal wall.

#### TRANSANAL TOTAL PELVIC EXENTERATION.

WV8

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Saku, Japan

**Purpose/Background:** For T4 locally advanced primary rectal cancer, total pelvic exenteration (TPE) is a potentially curative strategy to achieve an R0 resection. Until now, laparoscopic TPE was successfully performed by some experienced laparoscopic surgeons. However, it still remains many issues to achieve laparoscopic TPE with the conventional transabdominal approach. These issues are hard visibility, more blood loss, increase of the surgical

time, and so on. They are more severe on us for the giant tumor in particular. We introduced transanal minimally invasive surgery (TAMIS) into TPE as transanal TPE (TaTPE).

**Methods/Interventions:** From June 2016 to November, 7 consecutive patients underwent TaTPE for T4 rectal cancer. They were all males. Three of them underwent intersphincteric resection as preservation of the anal function, the others Miles operation. TAMIS and laparoscopic procedure including mobilization of the colon and lymphadenectomy around the IMA were performed simultaneously by two teams. TaTPE was performed as en bloc resection of the pelvic organs enveloped within the visceral pelvic fascia. The dorsal vein complex was divided with the excellent visibility after the urethra was transected during TaTPE. The ileal conduit was constructed extracorporeally through an extended umbilical incision. Before then, the specimen was extracted through the umbilical incision.

**Results/Outcome(s):** None of the TAMIS procedures had to be converted to other surgeries. The median surgical blood loss was 180 mL (range, 80-420 mL), the median total surgical time was 382 min (range, 340-465 min), and the median postoperative hospital stay was 18 days (range, 15-26 days). The positive CRM rate was 0%. The procedures were associated with a 66% morbidity rate.

**Conclusions/Discussion:** TAMIS is a promising approach for TPE with significant advantages including excellent visibility, less blood loss, and reduction of the surgical time.

## PODIUM ABSTRACTS

### INITIAL EXPERIENCE WITH 7T MRI IMAGING OF RECTAL CANCER: A PROMISING TECHNOLOGY FOR SUPERIOR STAGING.

NT1

J. Blank, N. Berger, P. Knechtges, R. Prost, K. Oshima, C. Peterson, K. Ludwig, T. Ridolfi  
Milwaukee, WI

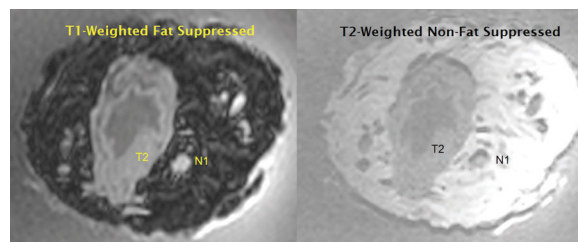
**Purpose/Background:** Magnetic Resonance Imaging (MRI) has become the preferred method for rectal cancer staging. However, current MRI technology, operating at a magnetic strength of 1.5-3 Tesla (T), still results in an incorrectly reported tumor depth in 1/3 of individuals. Furthermore, contemporary MRI is unable to reliably discern a complete response to neoadjuvant therapy, which can occur in 10-30% of patients. The Medical College of Wisconsin Center for Imaging Research houses one of only twenty experimental 7T MRIs worldwide capable of imaging the human pelvis. The current study represents the first use of 7T MRI imaging of the human rectum. We present our experience in this novel imaging technique.

**Methods/Interventions:** Patients undergoing surgical resection for rectal cancer were enrolled in the trial. Following removal the specimen was secured and submerged in a normal saline-filled canister and scanned in the 7T MRI. Multiple sequences were obtained, including T1-weighted 3D RF-spoiled gradient echo isotropic sequence and a T2-weighted 3D fast spin echo isotropic sequence (GE, Milwaukee, WI). A radiologist blinded to the pathologic data interpreted the images. The radiologist's read was then compared to the pathology report to determine accuracy.

**Results/Outcome(s):** Between July 2015 and September 2016, 6 patients met inclusion criteria. When utilizing the T1-weighted fat-suppressed sequences, radiologic and pathologic interpretation of the specimen was identical regarding tumor depth in 5 of 6 patients (83%). The tumor that was understaged as T2 by imaging was pathologically T3, but only extended 200  $\mu$ m beyond the muscularis propria. Additionally, nodal status was correctly interpreted by MRI in 6 of 6 patients (100%). Some nodes as small as 2mm were correctly identified as harboring malignancy on 7T images.

**Conclusions/Discussion:** 7T MRI provides excellent resolution of all layers of the rectal wall, enabling accurate determination of tumor depth. Malignant characteristics of lymph nodes, such as spiculations and loss of nodal hilum are also identifiable. The increased accuracy of T1-weighted fat-suppressed imaging at 7T over the current convention of using T2-weighted imaging is likely due to increased signal-to-noise ratio and increased spatial resolution at 7T. With its superior signal-to-noise ratio and spatial resolution, 7T MRI holds promise in improving the staging of rectal cancer and in accurately identifying those with a complete response to neoadjuvant therapy. We have demonstrated the feasibility of 7T MRI in rectal

cancer and will be expanding our work to image rectal cancers in vivo.



### INTRALUMINAL BYPASS DEVICE FOR THE REPLACEMENT OF DIVERTING STOMA : RESULTS FROM FIRST PROSPECTIVE CLINICAL TRIAL IN 20 PATIENTS.

NT2

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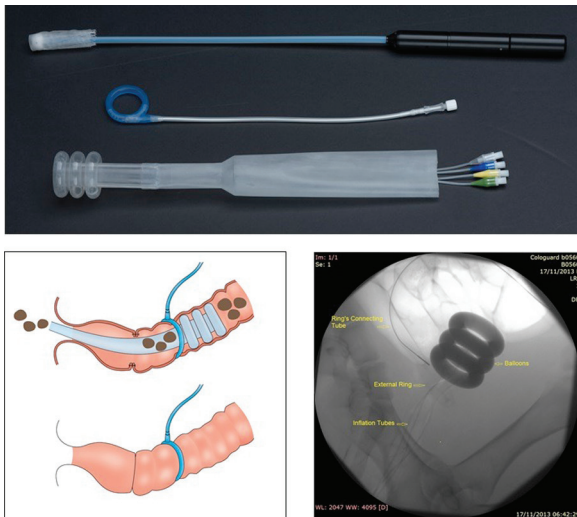
**Purpose/Background:** The Cologuard CG-100 is a novel intraluminal bypass device designed to improve the clinical outcomes associated with low colorectal anastomotic leak (FIG 1). The device is inserted trans-anally anchored to the colon above the anastomosis, and deployed intra-luminally to cover the anastomosis from within. Previous study in a porcine model showed that the device efficiently reduced contact between fecal content and low colorectal anastomosis and was easily deployed and extracted. The purpose of this study was to evaluate the safety and performance of the device in patients undergoing colorectal anastomosis.

**Methods/Interventions:** Twenty consecutive patients underwent colorectal anastomosis with insertion of the Cologuard CG-100 device. After 10 days, when the risk for leakage was reduced, the anastomosis integrity was examined by contrast which was injected through a catheter between the silicon sheath and the colonic mucosa and the device was pulled out. Data regarding demographics, surgical details, and 30 day post-operative complication were collected prospectively. Measure of the device performance was evaluated. Physician and patients' satisfaction were evaluated by questionnaires.

**Results/Outcome(s):** 20 patients underwent colorectal surgery using the new CG-100 device, 11 males (55%) with median age of 65.1  $\pm$  9.7. Indication for surgery was colorectal cancer and the median distance of the anastomosis from the anal verge was 7.4 $\pm$ 4.5 cm. Preoperative Neo adjuvant radiation was given in 30% of the patients. Majority of the procedures were performed in a laparoscopic approach with median surgery duration of 172 minutes and the median application time of the CG-100 device was 10 minutes. In 7 cases (35%) a diverting stoma was performed on top of using the CG-100 device.

Application and removal of the device was performed uneventfully in all 20 cases. 6 patients (30%) experienced post-operative morbidity (2 anastomotic leakages, 1 wound infection, 1 abdominal collection and 1 patient with minor rectal bleeding post removal of the device). The device required minimum, if any, training to learn how to apply. The overall complexity of the device was intuitive. The device was easily deployed and extracted. Patients did not report major discomfort caused by the sheath. A minimal incontinence for loose stool was observed as long as the sheath was in situ.

**Conclusions/Discussion:** The CG-100 reduces the contact of fecal stream with the anastomotic site. The device is easy to install with no major complications and may replace the usage of ileostomy in order to protect the anastomotic site. A study with a larger sample size is ongoing to further investigate the safety and performance of the CG-100 device.



### RADIO FREQUENCY ABLATION FOR HIGH GRADE ANAL INTRAEPITHELIAL NEOPLASIA IN HIV PATIENTS: SHORT-TERM OUTCOMES.

NT3

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Mexico, Mexico

**Purpose/Background:** Anal dysplasia and carcinoma are substantially linked to the oncogenic VPH infection, and up to 30% of patients with high-grade dysplasia progress to cancer in long term follow-up. Radiofrequency ablation (RFA) has been successfully used to treat Barrett esophagus. We evaluated the safety, feasibility and short-term outcomes of RFA in HIV patients with high-grade anal intraepithelial neoplasia (HGAIN).

**Methods/Interventions:** We included all HIV patients with HGAIN from January 2014 to September 2015 in a referral center in Mexico City. RFA was applied with

Barrx™ System (Medtronic) under regional anesthesia. Postoperative pain, morbidity, healing time and dysplasia regression were analyzed. Dysplasia regression was evaluated with high-resolution anoscopy (HRA) and/or anal cytology.

**Results/Outcome(s):** Twelve male patients with a mean age of 42 years (20-67) were included. All patients were diagnosed with HGAIN by means of anal cytology and subsequently HRA. Treatment was delivered using 12 joules and moving circumferentially at the anal canal for a mean number of 47 cycles (35-60). Patients were discharged the next day. After RFA, pain decreased from 8 during the first week to 3 at one month. Postoperative morbidity was 8.3% (perianal abscess). Mean healing time was 4 weeks (range from 3 to 5). Mean follow-up was 8.2 months. Seven patients showed regression to low-grade intraepithelial neoplasia (58%) and only 2 (7%) remained with HGAIN. There was a complete remission of the dysplasia in 3 patients (25%).

**Conclusions/Discussion:** RFA is a feasible and safe procedure in HIV patients with HGAIN with a low morbidity rate. In our study, there was no progression to cancer in any patient. Overall HGAIN remission and regression rate was 83%. Longer follow-up with more patients are needed to validate these outcomes.

### MINIMAL INVASIVE TREATMENT OF PILONIDAL CYSTS AND HEMORRHOIDS WITH A LASER.

NT4

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**Purpose/Background:** Pilonidal cyst (PNS) is a common disease in young adults. There are various surgical treatment options, which all face the same obstacles as recurrence, wound healing disturbances, cosmetics and a long healing time, often associated with a long work leave. We want to introduce a new minimal invasive treatment modality for PNS, which combines the traditional Pit Picking technique with additional laser treatment of the subcutaneous fistula track and abscess cavity with the FiLaC® laser system.

**Methods/Interventions:** Prospective single center study from 10/2014 to 10/2016. Laser treatment of PNS was performed in cases without an acute abscess. The pits were surgically removed using a 4-6 mm biopsy punch and the underlying fistula track was treated with a FiLaC® laser fiber at 13 watts, continuous mode at a wavelength of 1470 nm (Leonardo Dual 25 Laser, Biolitec, Germany). Follow up was conducted at day 1, 7, 14, 8 weeks and 6 months after the operation. Telephone interviews were performed up to 2 years if possible (3-24 months).

**Results/Outcome(s):** 64 patients were treated for symptomatic Pilonidal cysts (55 males and 9 females). Median



age was 29,1 (16-51 years old). 35 patients had a primary disease (group 1) whereas 29 patients underwent surgery for a recurrent disease (group 2). The median amount of pits was  $3,6 \pm 2,8$  and the median length of the fistula track was  $5,7 \pm 2,8$  cm. The healing rate was 85.7 % (30/35) in group 1 and 86.2 % (25/29) in group 2. Chronic wound healing disturbances were observed in 5.7 % (n=2) in group 1 and 13.8 % (n=4) in group 2. An early recurrence occurred in three patients (8.9 %) in group 1. Consecutively, two out of three patients were successfully re-operated either with Pit Picking alone (1/2) or a second laser treatment (1/1). No recurrence was observed in group 2. No morbidity was observed in both groups. Time until complete wound healing was  $6.5 \pm 1.6$  weeks in both groups. When a chronic wound healing problem was present, complete healing could take up to 9 months.

**Conclusions/Discussion:** Minimal invasive laser treatment for PNS is a safe and successful new surgical method. The effectiveness is similar in both primary and recurrent disease. Besides the high healing rates, patients benefit from small wounds, low pain, excellent cosmetic results and an early return to work. The procedure can be performed in local anesthesia in an outpatient setting and it can be easily repeated if recurrence takes place.

#### A NOVEL SURGICAL DEVICE COMBINING CONTINUOUS INTRAOPERATIVE WOUND IRRIGATION AND BARRIER PROTECTION MARKEDLY REDUCES INCISIONAL CONTAMINATION IN COLORECTAL SURGERY.

NT5

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**Purpose/Background:** Surgical site infection (SSI) remains a persistent and morbid problem in colorectal surgery. Key to its pathogenesis, particularly for incisional SSI, is the degree of intraoperative bacterial contamination at the surgical site. Reduction of this bacterial load has been shown to decrease the risk of subsequent SSI. A novel surgical device that combines barrier wound protection and continuous wound irrigation was recently developed as a strategy to reduce intraoperative wound contamination. The effectiveness of this device at contamination reduction was tested in a cohort of elective colorectal surgery patients.

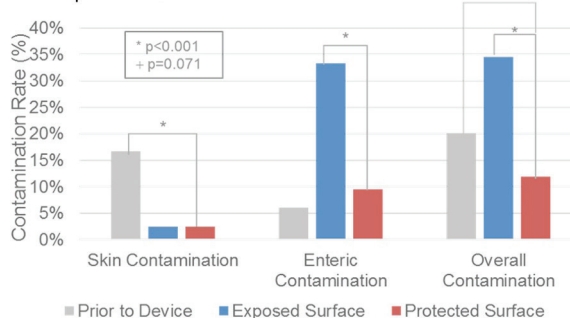
**Methods/Interventions:** A prospective multi-center study of surgical incisions in patients undergoing elective colorectal operations was conducted at 7 medical centers. The study device was used for wound protection and retraction, as well as irrigation of the incision with normal saline mixed with an antibiotic of surgeon's choice. Three separate culture swabs were collected from a) the

incision edge prior to device placement, and from the b) protected incision and c) exposed surfaces of the device prior to device removal. Culture results were aggregated and compared amongst the three groups. Patients were followed for 30 postoperative days to track for adverse events (AEs), including device-related AEs and SSI.

**Results/Outcome(s):** A total of 86 patients were eligible for intention-to-treat analysis. Forty cases (47%) were performed with open or hand-assist laparoscopic techniques. All cases involved extracorporeal bowel division and/or anastomosis. Sixteen cases (19%) involved rectal resection. The overall degree of exposure of the surgical site to bacterial contamination, based on the rate of positive culture results on the exposed surface of the device sheath, was 34.5%. Use of the study device was associated with a 66% reduction in overall bacterial contamination at the protected incision vs exposed surface of the device (34.5% vs 11.9%,  $p < 0.001$ ), and 71% reduction in enteric bacterial contamination (33.3% vs 9.5%,  $p < 0.001$ ). In addition, use of the device resulted in an 86% reduction in pre-existing skin flora contaminants that were present despite sterile skin prep (16.7% vs 2.4%,  $p < 0.001$ ). The rate of SSI in patients completing the protocol was 3.7%, with a 1.2% rate of incisional SSI. There were no AEs attributed to device use.

**Conclusions/Discussion:** This study is, to our knowledge, the most comprehensive survey of wound microbiology of surgical incisions in colorectal surgery. Use of a novel device combining barrier wound protection and continuous intraoperative wound irrigation is associated with a dramatic reduction in bacterial wound contamination, from both enteric and skin flora. Novel methods to counteract wound contamination represent a promising strategy for SSI prevention.

Figure. Rate of contamination at incision edge before and after device placement



## VIDEO ABSTRACTS

### MODIFIED LIGATION OF INTERSPHINCTERIC FISTULA TRACT (LIFT) VIDEO.

VR1

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**Purpose/Background:** Ligation of intersphincteric fistula tract (LIFT) procedure has been described as an alternative approach to address transsphincteric anal fistulas where a fistulotomy is considered unadvisable. We demonstrate the key steps in performing this procedure. We emphasize testing of the external sphincter repair as well as complete excision of the external fistula tract.

**Methods/Interventions:** This video details the key steps involved the LIFT procedure. We believe that the key elements of the procedure involve 1) Positioning the patient in prone jackknife position 2) Adequate anal canal relaxation with a local anesthetic block 3) Effacement of the anus with a self-retaining retractor 4) Identification and dissection of the intersphincteric space 5) Control and ligation of the fistula 6) Testing of the fistula ligation with peroxide 7) Repair of any leaks 8) Excision of the external fistula tract.

**Results/Outcome(s):** The case described is a 35 year old woman with 2 previous partial fistulotomies found to have an anterior transsphincteric fistula. A seton was placed 3 months prior to the procedure. She underwent a LIFT procedure utilizing the elements described above. She returned with complete closure of the external fistula tract and intersphincteric incision 12 weeks following surgery.

**Conclusions/Discussion:** LIFT procedure is an effective and alternative method for transsphincteric anal fistula repair

### REPAIR OF A RECTOVAGINAL FISTULA AFTER A COLORECTAL ANASTOMOTIC LEAK.

VR2

S. Marecik, T. Sheikh, G. Valladolid, C. Warner,  
K. Kochar, J. Park, L. Prasad  
Park Ridge, IL

**Purpose/Background:** The patient is a 60 y.o. female with a history of ovarian cancer for which she underwent 4 laparotomies. The last one involved a colorectal anastomosis which resulted in a leak and fistula formation. Previous fistula repairs have failed.

**Methods/Interventions:** The fistula was repaired transanally under the protection of an ileostomy. All diagnostic and therapeutic steps are presented.

**Results/Outcome(s):** The repair was successful. The stoma was reversed at 3 months.

**Conclusions/Discussion:** Transanal repair of a rectovaginal fistula after colorectal anastomosis is feasible in selected patients.

### TRANSANAL EXTRACTION OF SPECIMEN DURING RESECTION RECTOPEXY FOR CHRONIC RECTAL PROLAPSE IN A 19-YEAR OLD MALE (VIDEO).

VR3

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Grand Rapids, MI

**Purpose/Background:** Resection rectopexy offers an excellent opportunity to combine laparoscopic resection with trans-anal specimen extraction. The patulous anus and anal hypotonicity associated with chronic rectal prolapse facilitates ease of specimen extraction. We present a 19-year old male with an 8-year history of chronic, full-thickness rectal prolapse and concomitant fecal incontinence. Work-up for congenital conditions was negative. He was referred for elective surgical intervention. He was noted to have a patulous anus and low resting anal tone. Resection rectopexy was offered, with possibility of natural orifice specimen extraction.

**Methods/Interventions:** The video attached demonstrates the surgical technique popularized by surgeons in Lueven, Belgium. The sigmoid colon and splenic flexure were mobilized, and the left colic artery and vein were transected. The posterior rectum was dissected to Waldeyer's Fascia, leaving the lateral peritoneal attachments intact. The anterior peritoneum was dissected, excess peritoneum was liberated from the Pouch of Douglas to affect an enterocele repair. The anterior peritoneum was re-approximated with a running suture. The proximal colon was transected, after which the sigmoid mesentery was dissected away from the colon. Creating two specimens facilitated trans-anal extraction. A colotomy was made in the distal sigmoid colon. The specimen, then its mesentery were extracted through the colotomy, using a plastic bag and a laparoscopic Babcock grasper. A 29mm anvil was then trans-anally introduced into the abdomen. The rectal stump was closed with a stapler. The anvil was placed into an anti-mesenteric tinea through a colotomy in the proximal colon, which was closed with a stapler. The two newly created colon specimens were removed through a 10mm port-site at the end of the case. A circular stapled anastomosis was created. A flexible sigmoidoscope was used to visualize the anastomosis, simultaneously conducting a leak test (negative). The lateral peritoneal attachments were affixed to the sacral promontory, completing the rectopexy.

**Results/Outcome(s):** The case duration was 2 hrs, 53 mins. EBL was 15mL. Pre-op CCF- Fecal Incontinence Score was 11. Post-op score improved to 5. Recovery was unremarkable, without complications related to surgery. Expectedly, the patient continued to suffer fecal incontinence and was therefore referred on for possible sacral nerve stimulation. Permanent leads were eventually inserted 3 months post surgery.

**Conclusions/Discussion:** This case illustrates that trans-anal specimen extraction during laparoscopic surgery is a safe and effective alternative to traditional means. The additional maneuvers required to extract the specimen are offset by the time saved creating an extraction site, as well as potential reduction of post-op pain and hernia. This technique could be applied in a broader fashion in a subset of patients who meet the appropriate criteria.

#### LADD PROCEDURE FOR ADULT MALROTATION WITH VOLVULUS.

VR4

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**Purpose/Background:** Intestinal malrotation is a rare congenital abnormality due to incomplete or lack of rotation of the intestines around the superior mesenteric artery axis. It rarely presents in adulthood. Patients can present with acute onset abdominal pain secondary to volvulus and ischemic bowel or with an indolent course of chronic, vague abdominal pain. Diagnosis can be made with multiple imaging modalities.

**Methods/Interventions:** We present a video demonstrating an adult with malrotation and volvulus who underwent an open Ladd procedure (correction of intestinal malrotation) with inversion appendectomy and reduction of a paraduodenal hernia.

**Results/Outcome(s):** The patient underwent successful open Ladd procedure with reduction of paraduodenal hernia.

**Conclusions/Discussion:** Malrotation with volvulus in adults is a rare cause of abdominal discomfort or bowel obstruction in adults. Surgical intervention with Ladd procedure is the treatment of choice.

#### DOUBLE BALLOON COLONIC ESD: TECHNICAL AND OUTCOME IMPROVEMENTS OVER CONVENTIONAL CAP TECHNIQUE.

VR5

S. Sharma, H. Hara, J. Milsom  
New York, NY

**Purpose/Background:** The established endoscopic submucosal dissection (ESD) technique for removal of large colonic polyps requires pushing of the scope tip, equipped with a plastic cap, under and around the polyp. The cap provides traction and “stand-off” between tissue and the colonoscope camera, but substantially limits the view and subjects it to debris and poor visualisation from electrosurgery. We considered using a Double Balloon (DB) device with independent inflation control and variable distance function to overcome these limitations, in particular providing tissue traction. We set out to evaluate

the standard cap technique versus a novel DB technique (no cap) in performing ESD in an experimental model.

**Methods/Interventions:** Fresh ex-vivo porcine recto-sigmoid colon was used in an established “polyp excision” model. Twelve 4 cm mucosal “lesions” were outlined and targeted for complete ESD with a 5 mm margin. Traditional ESD method using a cap technique (n=6) (Olympus cap D-201-12704) or DB method using a novel device (n=6) (DiLumen<sup>®</sup>, Lumendi, LLC) was performed in an alternate fashion using a pediatric colonoscope (Olympus PCF-H180AL). Monopolar electrosurgery using the ERBE electrosurgical generator with Olympus dual-knife (KD-650U) were used in all procedures to remove the “polyp” (80w Cut 40w Coagulation). Variables measured were time to complete procedure, % completion (procedure time was limited to 80 minutes), clear margins, perforations, and a 6 point scoring system for various parameters relevant to endoscopy (Scoring system: 1=excellent, 2=good, 3=above average, 4=below average, 5=minimal, 6=none). Data was recorded and analysed using Graphpad Prism software. All procedures were recorded (both the endoscopic view and external operator view) and resected specimens (both colon and removed polyp) photographed.

**Results/Outcome(s):** By the sixth attempt, time to complete ESD was similar in both techniques (30 vs 33 minutes – red and blue - table 1). Clear margins were maintained in all specimens. Minor perforations were observed in the DB group during the first 2 attempts, no perforations were observed by the last attempt.

**Conclusions/Discussion:** In an experimental ex-vivo ESD colon polypectomy model, an independently controllable DB endoscopic system substantially improved stability and visualization compared with cap-assisted ESD, with a similar safety profile. Despite the early nature of this feasibility study, the DB assisted technique holds promise to expand the capabilities of endoluminal therapy.

	ESD technique		p value
	Cap	DB	
n=	6	6	
Time for procedure (mins)	57 (± 21)	63 (±19)	0.3
% complete	75 (±38)	85 (±22)	0.6
Clear Margins (yes/no)	6	6	NS
Minor Perforation (yes/no)	0	0.5	0.1
Major Perforation (yes/no)	0	0	NS
Stability	5 (±1)	2 (±0)	*< 0.0001
Visualisation	4 (±1)	2 (±0)	*0.0005
Sweeping motion	1 (±0)	3 (±1)	*< 0.0001
scope centering in lumen	4 (±1)	2 (±1)	*< 0.0001
segmentalisation (insuff and suction)	6 (±0)	2 (±1)	*< 0.0001
balloon retraction (mucosal retraction)	4 (±1)	2 (±1)	*< 0.0001

\*Scoring system: 1=excellent, 2=good, 3=above average, 4=below average, 5=minimal, 6=none  
\*denotes significance (students t-test)

Table 1: Outcome Comparison Double Balloon versus Cap ESD Technique.

## TAMIS AS AN EMERGENCY PROCEDURE IN POST RECTAL POLYPECTOMY BLEEDING.

VR6

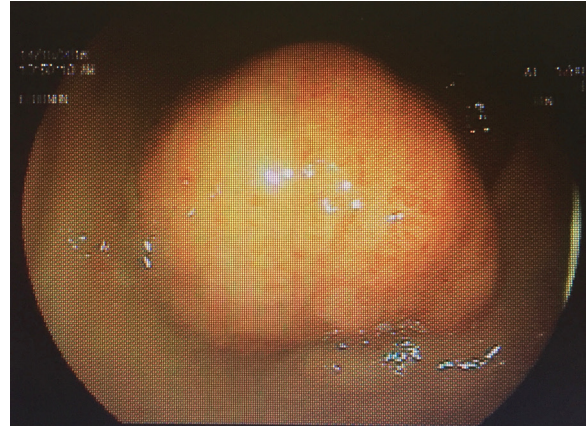
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Ashford, United Kingdom

**Purpose/Background:** TAMIS (Trans-Anal Minimally Invasive Surgery) has been adopted by the colo-rectal surgeons as an alternative option to TEM/TEO platforms; to treat the early rectal tumor and the large rectal polyp on an elective basis. TAMIS platform uses conventional laparoscopic instruments to achieve high-quality local excision. Though TAMIS has been used in the elective setting, its use in emergency scenarios has not been reported often. To our knowledge, this is the first case report where TAMIS was effectively used as an emergency procedure to control the post rectal polypectomy bleeding.

**Methods/Interventions:** A 67-year-old male patient was referred to lower GI endoscopy with a history of altered bowel habit. The patient did not have any major co-morbidity, and there were no pre-procedural imaging available as endoscopy was the first planned investigation. Flexible sigmoidoscopy was performed by the gastroenterologist, which revealed a 30 mm benign looking polyp (IS, Pit Type III) and it was situated in left lateral aspect of the rectum 8 cm proximal to anal verge. The polyp was lifted with Volplex® and a large electrosurgical snare was used in an attempted polypectomy. Profuse bleeding started midway through the polypectomy, the bleeding was not controlled despite adrenaline injection and argon beam diathermy. A curacel® hemostatic gauze was placed on the polypectomy site and an immediate consult was done with the surgical team. We decided to do the TAMIS procedure as the bleeding was profuse causing hypotension; it was not controlled with the conventional methods. The patient was transferred to the operation theater, where TAMIS procedure was done successfully to excise the rectal polyp. The patient was discharged home after 24 hours of in-hospital monitoring. Histology of the polyp showed villous adenoma with low-high grade dysplasia and no malignancy.

**Results/Outcome(s):** As above.

**Conclusions/Discussion:** In the review of the literature, we have come across other applications of the TAMIS procedures in elective settings (ligation of rectal Dieulafoy's lesion, removal of recto-sigmoid foreign body, repair of rectourethral fistula). We feel that considering the versatility of the TAMIS platform, its use can be extended beyond the elective local excision of rectal lesions. TAMIS should also be considered as a safe alternative option in an emergency setting like post-polypectomy bleeding.



## PILONIDAL DISEASE: CLEFT LIFT RECONSTRUCTION WITH URINARY BLADDER XENOGRAFT AUGMENTATION.

VR7

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**Purpose/Background:** This video presents a case of a 20 year old male with a history of recurrent pilonidal abscesses. He underwent incision and drainage in the office. After this area was healed, he was brought to the operating room for cleft lift reconstruction with placement of porcine bladder xenograft.

**Methods/Interventions:** Retrospective review of 35 patients who underwent surgical treatment for pilonidal disease. 21 patients received excision alone. 15 Patients underwent excision with placement of porcine bladder xenograft.

**Results/Outcome(s):** The patient was discharged following the procedure with a closed suction drain. He returned to the office on POD 9. The drain was removed and the incision was intact. The sutures were removed the following week. 35 consecutive cases were examined. These were all performed by a single surgeon. 21 patients were treated with excision alone. 15 patients were treated with excision and xenograft placement. 20/21 patients treated with only excision received a paramedian incision as well as a midline incision for pit removal. In the xenograft group, 4/14 patients were treated in this fashion. The remaining patients in both groups were treated using a single paramedian incision. The excision group had a wound complication rate of 76%. This included 7 complications requiring specific wound care, and 9 minor complications that were managed with surveillance alone. The xenograft group had a wound complication rate of 50%, but only 2 of these patients required specific wound care. The average wound healing time in the excision group was 65.19 days. The healing time in the xenograft group was 39.36 days.

**Conclusions/Discussion:** Review of these 35 patients undergoing treatment of pilonidal disease reveals a

decreased wound complication rate as well as a shorter healing time in the 15 patients who received porcine bladder xenograft. Although 50% of the xenograft patients did have wound healing problems, the majority of these were small and did not require specific wound care. Certainly, the wound healing time of 39.36 days was improved compared to the excision group's time of 65.19 days. This data set clearly shows a difference between the two groups. However, further analysis with a larger patient population will be necessary. Also, a standardized surgical technique must be utilized in future studies. The patients in this study who received only one incision off the midline typically had better outcomes compared to the patients who had both paramedian and midline incisions. The role that xenograft placement plays in the healing of these paramedian incisions will continue to be analyzed.

### EXCISION OF A PRESACRAL MASS IN A PATIENT WITH CURRARINO SYNDROME.

VR8

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Chicago, IL

**Purpose/Background:** Currarino Syndrome is a rare but well described genetic disorder due to an autosomal dominant box mutation on chromosome 7. Carriers commonly present with a triad of sacral dysgenesis, a presacral mass and anorectal malformations. Renal, gynecologic and other abnormalities may also be present.

**Methods/Interventions:** We present a case of a 59 yo woman with Currarino syndrome who underwent parasacral excision of a large presacral epidermoid cyst. A video of the procedure was recorded and edited and a discussion of the syndrome was added.

**Results/Outcome(s):** In the video, the syndrome will be discussed, and the procedure will be demonstrated.

**Conclusions/Discussion:** Currarino Syndrome is a rare but well described genetic disorder of the hindgut and sacrum that colorectal rectal surgeons should know. Parasacral excision is an important method of resection of presacral masses that all colorectal surgeons should be able to perform.

### USE OF THE IMV AS AN INITIAL LANDMARK FOR MEDIAL TO LATERAL DISSECTION IN MINIMALLY INVASIVE LEFT SIDED COLECTOMIES.

VR10

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E. Pappou  
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**Purpose/Background:** Retromesenteric medial to lateral dissection for left sided colectomy often begins

beneath the IMA pedicle. However, in the setting of dense mesenteric fat the IMA can at times be difficult to identify. In this situation, the IMV presents a more readily available anatomical landmark for the dissection. It is therefore beneficial to be comfortable with both approaches to the dissection. This video uses one of our robotic cases to demonstrate the step-by-step technique for safe retromesenteric dissection beneath the IMV.

**Methods/Interventions:** We reviewed our colorectal video database and identified the video that best demonstrated the technical and anatomic features of retromesenteric dissection beneath the inferior mesenteric vein.

**Results/Outcome(s):** Retromesenteric dissection beneath the IMV has proved to be a safe and effective initial step in medial to lateral left sided colectomy.

**Conclusions/Discussion:** Given unpredictable anatomy and increasing obesity in the population, it behooves surgeons who perform left sided colectomies with a medial to lateral approach to be comfortable dissecting beneath both the IMA pedicle and the IMV.

### ICG-GUIDED LAPAROSCOPIC D3 LYMPHADENECTOMY FOR RIGHT-SIDED COLON CANCER.

VR11

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**Purpose/Background:** Surgical resection of the lymph nodes (located around the root of the feeding artery) is a key part of D3 lymphadenectomy and central vascular ligation for colon cancer surgery. The D3 lymph nodes (main lymph nodes) of right-sided colon cancer are positioned on the ventral side of the SMV and SMA. Under the white light, however, it is challenging to identify the boundary of the D3 lymph nodes. We used ICG (indocyanine green) to guide the territory of D3 lymphadenectomy during laparoscopic resection of right-sided colon cancer.

**Methods/Interventions:** From June 2016 to November 2016, nine patients underwent ICG-guided laparoscopic right hemicolectomy with D3 lymphadenectomy after completing the informed consent form. We performed endoscopic injection of ICG (total amount: 0.2-0.3ml; 2.5mg/ml) into the submucosal layer of the tumor or peritumoral lesion on one day before surgery. Colon mobilization was performed along the embryologic planes followed by D3 lymphadenectomy and central vessel ligation. During D3 lymphadenectomy, all fluorescing lymph nodes along the SMV or SMA were dissected.

**Results/Outcome(s):** The injection of ICG in the submucosal layer and real-time identification of the D3 lymph nodes during surgery was successful in all patients without any complications. The fluorescing lymph nodes were found along the SMV in all patients. The median number of total harvested lymph nodes in all patients

was 35 (range, 22-76). When the regional lymph nodes were classified according to location, the median numbers of lymph nodes are as follows: 19 (range, 12-33) for D1 (pericolonic) lymph node; 7 (range 0-17) for D2 (intermediate) lymph node; 9 (range 5-34) for D3 lymph nodes. No patients had pathologically metastatic lymph nodes.

**Conclusions/Discussion:** ICG-enhanced real-time fluorescence imaging is an easy and safe technique to identify D3 lymph nodes of right-sided colon cancer. This technique can guide the territory of D3 lymphadenectomy during laparoscopic resection of right-sided colon cancer.

### ROBOTIC COMPLETE MESOCOLIC EXCISION FOR RIGHT SIDED NEUROENDOCRINE TUMOR.

VR12

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**Purpose/Background:** In this video, we present technical details of a robotic complete mesocolic excision with high vascular tie and intracorporeal side to side anastomosis with omental pedicle flap.

**Methods/Interventions:** This was a 67 year-old male with ascending colon cancer. He previously had no abdominal operations. Patient was positioned to modified lithotomy and the da Vinci Xi system (Intuitive Surgical Inc., Sunnyvale, CA, USA) was used for the procedure (Video). Four robotic ports, one assistant port and one AirSeal (Conmed, Largo, FL, USA) port were used for the procedure. The dissection was performed medial to lateral fashion.

**Results/Outcome(s):** Operating time was 240 minutes and blood loss was 50 ml. There was no postoperative complication and the patient was discharged from the hospital at postoperative day 3.

**Conclusions/Discussion:** Robotic curative oncological surgery for right colon cancer can be done safely. Robotic platform facilitates dissection, intracorporeal suturing and also represents recovery advantages of minimally invasive surgery.

### EXTENDED RIGHT HEMICOLECTOMY WITH COMPLETE MESOCOLIC EXCISION.

VR13

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TAICHUNG, Taiwan

**Purpose/Background:** To demonstrate laparoscopic right hemicolectomy with complete mesocolic excision. Complete mesocolic excision achieves good oncologic clearance.

**Methods/Interventions:** No pre operative bowel preparation. Patient in trendelenberg position. Surgeon standing

between the legs. Laparoscopic approach - 3 ports. One umbilical - camera port. Two 5 mm dissecting ports, one in suprapubic region and the other in right iliac fossa. The procedure starts with retrocolic dissection along the lines between parietal and the visceral fascia. Dissection of duodenum and uncinat process along the lines of Toldt's fascia. Ileocolic vascular pedicle dissection till SMV. Fibrofatty clearance of the SMV. Ligation of ileocolic pedicle. Ligation of Right colic pedicle. Ligation of Middle colic pedicle. Medial to lateral dissection of the mesentery. Lateral release of the ascending colon along the line of Toldt's. Specimen extraction through the umbilical port by using wound protector. Extracorporeal anastomosis.

**Results/Outcome(s):** CME is an extensive surgery than the standard procedure because it involves complete bearing of the lymphovascular tissue along the SMV.

**Conclusions/Discussion:** CME achieves good surgical and anatomical oncological clearance along the embryological planes.

### TOTAL MESOCOLIC EXCISION FLUORESCENCE-GUIDED: IN SEARCH OF LYMPHATIC FLOW.

VR14

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A. Ochogavia-Segui, J. Segura-Sampedro,  
M. Gamundi-Cuesta, F. González-Argenté  
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**Purpose/Background:** The aim of this video is to describe our technique using fluorescence to assess the lymph flow to ensure a complete mesocolic excision and central vascular ligation in order to provide expertise to contribute to the standardization of this new tool.

**Methods/Interventions:** 76 years male, classified as ASA II. A great tubular adenoma of the cecum with high-grade dysplasia was diagnosed. Laparoscopic right colectomy with total excision of the mesocolon is proposed. For the detection of lymph flow, we injected indocyanine green (2.5 mg/1.0 mL) into the subserosal to submucosal layer around the tumor at 1 point with a 21-gauge injection laparoscopically after trocar insertion, and observed the lymph flow using a near-infrared european system 25 minutes after injection. We also performed a total mesocolic excision with central vascular ligation in the region where the lymph flow was fluorescently observed. First lymphatic node was marked based on fluorescence imaging.

**Results/Outcome(s):** No intraoperative or postoperative complications presented. No adverse effects were reported due to the infusion of ICG. The lymph flow was visualized intraoperatively in a satisfactory way helping the surgeon in decision making to determine an appropriate separation line of the mesentery. The operating time was 90 minutes. Patient was discharged on the fifth day after

surgery. The histological result was tubular adenoma of the cecum with 14 isolated nodes without involvement including the sentinel node marked intraoperatively. The morphometric laboratory data of the specimen to audit the correct complete mesocolic excision were satisfactory according to the oncological standards.

**Conclusions/Discussion:** Fluorescence lymphography during colorectal surgery was feasible and reproducible with a minimum of added complexity. Fluorescence-guided surgery may be a helpful technique for determining an appropriate total mesocolic excision in colon neoplasms.

### PURE LAPAROSCOPIC SIGMOIDECTOMY WITH INFERIOR MESENTERIC ARTERY PRESERVATION.

VR15

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**Purpose/Background:** Patients undergoing left hemicolectomy have been noted to experience a postoperative defecatory disorder (PDD). This disorder is characterized primarily by fecal incontinence, soiling, urgency, alternate bowel function and stool fragmentation. Denervation of the distal colonic segment represents the main cause of PDD after sigmoid resection. The innervations of the descending colon and rectum are provided by either ascending fibers from the pelvic plexus or descending fibers from the inferior mesenteric plexus that run around the inferior mesenteric artery (IMA). Sectioning of the IMA at its origin during left hemicolectomy leads to a transection of the ascending and descending nerve fibers, which results in a denervation of the remaining distal colon. Preservation of the IMA by sectioning of the sigmoid arteries reduces the risk of colonic denervation and may improve postoperative intestinal functions, avoiding defecatory disorders.

**Methods/Interventions:** We present a case of a 53 years old woman with recurrent diverticulitis attacks. We decide to perform an elective laparoscopic sigmoidectomy using a medial-to-lateral mobilization with the inferior mesenteric vein as the initial landmark. The peritoneum under the inferior mesenteric vein is incised, and the space between the mesocolon and Gerota's fascia is developed. Inferior mesenteric vein is then divided. We preserve the IMA by sectioning of the sigmoid arteries just above the superior rectal artery. We make the section of the distal colon at promontorium level and make the specimen's extraction via transectal avoiding any abdominal incision and performing in this way a pure laparoscopic procedure. We introduce the envil transanally and close the rectal stump with stapler. We perform a colotomy in the proximal colon, introduce the stem and close the colon with stapler to finally perform a side-to-end colorectal anastomosis.

**Results/Outcome(s):** The total operative time was one hundred twenty minutes. The postoperative stay was

uneventful and the patient was discharged in postoperative day three. The pathological analysis showed the presence of multiple diverticula without malignancy.

**Conclusions/Discussion:** Dissection of the IMA at its origin with its surrounding tissue is needed to obtain complete lymph node removal in the treatment of rectosigmoid cancer, but in the surgical management of diverticular disease, the IMA is safely spared. Moreover, skeletization of the inferior mesenteric artery during left hemicolectomy for diverticular disease preserves the natural blood supply of the colonic and rectal stump, and the ensuing performance of a healthy and well-nourished anastomosis may prevent anastomotic leakage and avoid low anterior rectal syndrome. Preservation of the ima, although technically challenging, is a feasible and safe technique and should be recommended in all left hemicolectomies performed for benign diseases.

### ROBOTIC COMPLETE MESOCOLIC EXCISION WITH "TOP TO DOWN-NO TOUCH" TECHNIQUE FOR RIGHT SIDED COLON CANCER.

VR16

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Istanbul, Turkey

**Purpose/Background:** Complete mesocolic excision (CME) with high ligation of the vessels is a surgical technique including wide resection of the colonic mesentery for prevention of tumour cell spillage with accompanying lymph nodes. Complete removal of cancer bearing colonic segment with its supplying vessels is not a new idea in colon surgery for cancer. Radical colectomy following the lymphovascular isolation (*No Touch*) technique described by Rupert Turnbull in 1967. The idea behind the isolating and transecting the vessels primarily was to prevent venous spread of tumor cells during removal of the tumor. Minimally invasive application of this technique is still under debate. This educational video describes robotic complete mesocolic excision with "Top to Down-No Touch" technique for right sided colon cancer.

**Methods/Interventions:** 37 year-old, male was diagnosed with non metastatic ascending colon cancer and admitted to hospital for definitive surgery. His ASA score was 2, body mass index was 25.9 kg/m<sup>2</sup>. He has no co-morbid factors, no other prior operations and no family history for any type of cancer. The patient was positioned as split-legs position and the da Vinci Xi system (Intuitive Surgical Inc., Sunnyvale, CA, USA) was used for the procedure. Four robotic ports and one AirSeal (8mm) (Conmed, Largo, FL, USA) port were used for the procedure.

**Results/Outcome(s):** The operation was 300 minutes and estimated blood loss was 200 ml. No complication

was developed during hospital stay and the patient was discharged home on postoperative day 4. The pathology result revealed T3 and N0 (out of 62 lymph nodes).

**Conclusions/Discussion:** Robotic complete mesocolic excision with "Top to Down-No Touch" technique" is safe and feasible for right sided colon cancer.

### LAPAROSCOPIC REPAIR OF A POSTOPERATIVE PERFORATED DUODENAL ULCER WITH A FALCIFORM LIGAMENT PATCH.

VR17

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**Purpose/Background:** Patients undergoing surgery for inflammatory bowel disease are at increased risk for peptic ulcer for a number of reasons including steroid use, and the physiologic stress of major surgery. Perforated peptic ulcer is a rare but serious post-operative complication in inflammatory bowel disease patients undergoing surgery. This complication is rendered more challenging by the fact that omental patching is often not possible due to the small amount residual omentum after subtotal colectomy.

**Methods/Interventions:** This video presents an alternative approach to perforated ulcer repair by patching using the falciform ligament. The video shows a laparoscopic repair of a perforated duodenal ulcer in a patient 4 days after subtotal colectomy. Use of the falciform ligament was required due to the insufficient omentum after subtotal colectomy.

**Results/Outcome(s):** The patient recovered uneventfully from her perforated ulcer repair.

**Conclusions/Discussion:** The falciform ligament should be considered for use in treatment of in patients with perforated duodenal ulcers and insufficient omentum, such as those who have undergone subtotal colectomy.

### CHANGE IN THE SURGICAL STRATEGY BASED ON FLUORESCENCE IMAGING.

VR19

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**Purpose/Background:** Hypoperfusion is an important risk factor for anastomotic leakage in colorectal surgery. The etiology of anastomotic leaks is a multifactorial problem (male sex, level of anastomosis, tobacco use, preoperative radiation, etc.). Besides technical aspects, adequate bowel perfusion is the main factor in ensuring the integrity of an anastomosis. The currently literature available on open and minimally invasive surgery suggests that additional visualization of tissue perfusion with fluorescence imaging can add relevant information to determine

a well-perfused location for colorectal transections, thus leading to fewer anastomotic leaks. The aim of this video is to show how the assessment with fluorescence imaging can make change the surgical strategy.

**Methods/Interventions:** Once completed the division of the proximal mesocolon the anesthesia team inject 5-10 mg Indocyanine green. The perfusion became visible in the proximal bowel and is followed with the camera to mark the transection point. The distal stump is evaluated either during visualization of the proximal stump or prior to creation of the anastomosis. The anastomosis is then performed and and if required we can re-evaluate perfusion at this time. The case was a 72 years old female with an mriT3bN0 tumor 2.5 cm from the anal verge and was teated with transanal total mesorectal excision (TaTME) by 2 teams working simult (what we like to call Cecil approach). At the end of the mesorectal excision the specimen was extracted transanally. At this point intravenous ICG pulses were administered to assess colon vascularization and to establish the suitable place to section the proximal margin. Given that a favorable response was not obtained after ICG administration it was decided to mobilize the splenic flexure and make an auxiliary Pfannenstiel incision to examine the colon and ensure a well-vascularised anastomosis with no tension. ICG was injected again into the exteriorized specimen, achieving a good result, clearly identifying the section point and checking good vascularization of the coloplasty. A T-T manual anastomosis was performed, completing the procedure. A loop ileostomy was built as the patient had received preoperative radiotherapy and the anastomosis was low in the pelvis.

**Results/Outcome(s):** The surgery took 210 minutes. The patient started oral intake 24 hours after the surgery and left hospital on the 3rd postoperative day with no complications.

**Conclusions/Discussion:** From this video we can conclude that ICG provides a simple, adequate and safe option to evaluate the optimal site to perform the bowel transection and anastomosis in colorectal surgery.

### SALVAGING LAPAROSCOPIC J-POUCHES: A WORD OF CAUTION ABOUT POUCH TWISTS AND RETAINED RECTUMS.

VR20

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New York, NY

**Purpose/Background:** Ulcerative colitis (UC) treatment has evolved from an unknown disease process without effective diagnostic or therapeutic tools, to currently a vast field with biologic agents and creation of J-pouches to restore continence. Total proctocolectomy with J-pouch has become the standard of care for patients with UC. With a movement towards minimally invasive techniques,



such as laparoscopy and robotic assisted operations, there has been an emergence of complications that were relatively rare in open J-pouch creation. Our goal was to show with intra-operative video, the mechanical complications that led to pouch failure during re-operative pouch surgery.

**Methods/Interventions:** A prospective cohort of 3 patients who underwent re-operative J-pouch procedures were included. These 3 patients all underwent proctectomy with J-pouch creation laparoscopically at outside institutions.

**Results/Outcome(s):** The 3 patients all had previous laparoscopically created J-pouches. All 3 patients had retained rectums. Two patients also had pouch twists. One pouch was excised and a new J-pouch created, while 2 pouches were able to be salvaged through pouch augmentation. All patients had diverting loop ileostomies placed after pouch salvage.

**Conclusions/Discussion:** Re-operative pouch surgery is safe but requires multiple procedures and proper placement of a diverting ileostomy. Patients undergoing pouch salvage must be informed of the possibility of sub-optimal functional results. Since the trend in minimally invasive techniques has increased to encompass J-pouch construction, there has been a resurgence of retained rectums and pouch twists that have caused pouch failure, which maybe secondary to a limited view with laparoscopic instruments.

#### TRANSVESICAL ROBOTIC-ASSISTED REPAIR FOR RECTOVESICAL FISTULAE.

VR21

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**Purpose/Background:** Vesicoenteric fistulae are an uncommon, but well known late effect of pelvic radiation. These fistulae are complex and often associated with scar conditions, fibrosis, local tissue ischemia, sepsis and tumor recurrence. Radiation associated rectovesical fistulae rarely resolve without operative treatment. The standard abdominal exposure for treatment of rectovesical is difficult, and even after extensive pelvic dissection, it can be difficult to adequately see the fistula tract. On the other hand, a transanal approach limits the need for pelvic dissection, but may not be suitable for repair of complex fistulae involving multiple organs. In this video we illustrate an alternative transvesical approach for repair of rectovesical fistulae.

**Methods/Interventions:** Key steps of the operation include: 1) Opening the dome of the bladder, 2) Identification of the fistula tract from within the bladder and insertion of double-J stents into the ureters, 3) Separation of the rectum and bladder by alternately working from inside and outside of the bladder, 4) Excision of all friable tissue from around the fistula tract, 5) Repair the rectal defect in multiple layers, 6) Placement an

omental flap over the rectal repair, 7) Interposition of a sheet of acellular dermal matrix between the bladder neck and the omental flap as a supplemental barrier, 8) Repair the defect in the bladder neck and then 9) Closure of the access incision in the bladder dome. To minimize material entering either the rectum or bladder during healing, a loop ileostomy is performed as the last step of the operation. On the first day after surgery, temporary percutaneous nephrostomy tubes are also placed.

**Results/Outcome(s):** The transvesical robotic-assisted approach allows for minimally invasive treatment of difficult rectovesical fistulae, and avoids some of the pitfalls associated with the transabdominal and transanal approaches.

**Conclusions/Discussion:** The transvesical approach for treatment of vesicoenteric fistulae is unique because it simultaneously reduces the need for extensive and potentially risky mobilization of the rectum while improving the surgeon's ability to directly see and repair the fistula tract. It also facilitates preparation and transfer of soft tissue flaps such as the omentum, as well as the use of other biologic barriers to reduce the chances of recurrence. Neither transabdominal nor transanal surgery can offer all of these advantages.

#### SAVING THE J-POUCH IN A PEDIATRIC PATIENT.

VR22

H. Aydinli, E. Aytac, F. Remzi  
Cleveland, OH; New York, NY

**Purpose/Background:** Ileal pouch failure is defined as a condition when a patient needs a pouch revision or a permanent diversion. Around 10% of ileal pouch anal anastomosis (IPAA) fails in long term due to septic, mechanic and functional complications. Salvage of the ileal pouch is a challenging and demanding surgical procedure, which requires high surgical experience. Management of IPAA failure in children, particularly indications for revisionary surgery appear sparse and widely debated.

**Methods/Interventions:** We report a case of a 14-year-old male with a history of ulcerative colitis: presents with severe pouchitis, and cuffitis with a body mass index (BMI) 17 kg/m<sup>2</sup>. His past surgical history is significant for a 3-stage pouch creation. Exam under anesthesia revealed remnant rectum measuring 15 cm from the anal verge. A diverting loop ileostomy was created previously to perform 3-stage pouch salvage procedure. He was taken to the operating room for creation of revision IPAA and re-creation of the diverting loop ileostomy. A dense adhesiolysis and excision of remnant mesorectum with superior rectal artery were done before the pouch mobilization (Video). After anterior and lateral mobilization of the pouch was achieved, old pouch was salvaged and re-anastomosis was established.

**Results/Outcome(s):** A leak test was performed which was negative. Patient was discharged after an uneventful recovery on postoperative day 5.

**Conclusions/Discussion:** Trans-abdominal salvage is safe and feasible in pediatric patients with failed IPAA.

## SECONDARY APPENDICEAL MUCOCELE IN THE SETTING OF DIFFUSE GANGLIONEUROMATOSIS.

VR23

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**Purpose/Background:** Neoplasms of the appendix are very rare. Most are found incidentally on appendectomies performed for appendicitis. Carcinoid tumors represent >66% of all appendiceal tumors. Gastrointestinal tract ganglioneuromas are very rare. Associated with MEN2b, Neurofibromatosis 1 (NF1), Cowden syndrome, congenital defects, carcinomas, and polyp-forming diseases. Diffuse ganglioneuromatosis of appendix only mentioned in a few case reports, associated with NF1, treated with appendectomy.

**Methods/Interventions:** Case report, of neurofibromatosis with literature search. Laparoscopic single port cecectomy.

**Results/Outcome(s):** Case report of successful resection of mucocele and ganglioneuroma.

**Conclusions/Discussion:** Rare findings of ganglioneuroma in secondary mucocele of the appendix.

## AN INANIMATE EX-VIVO PIG STOMACH TRAINING MODEL TO ACQUIRE ESD SKILLS.

VR24

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**Purpose/Background:** Endoscopic Submucosal Dissection (ESD) allows for en bloc removal of large sessile lesions. It is the gold standard in Japan for large sessile adenomas and sm-1 superficial cancers. In the US these lesions are usually treated via segmental colectomy. To avoid colectomy, some American surgeons are learning ESD methods in which a needle knife is used to score the mucosa and to cut the polyp's submucosal attachments. This requires moving the scope tip with a knife extended and the current running. This is a skill that most endoscopists do not have. To acquire these skills and learn ESD an *ex vivo* pig stomach training model has been developed. This video is devoted mainly to presenting the model and a few preliminary results.

**Methods/Interventions:** The colon model consists of a hard hollow plastic tube with a rectangular window cutout over which a full thickness piece of pig stomach and then a bovey pad is placed and secured with rubber bands. The tube is attached to a flat plastic board to anchor it. The bovey pad is inserted into a high frequency electrosurgical generator. A round sponge with a central slit is placed in the tubes end and serves as the "anus". Prior to being placed in the model a hot wire loop is used to brand "the lesion" onto the mucosal surface. An ESD is then carried out using the standard instruments including: sclerotherapy catheter and saline lift solution (mucosal lift), needle knives (straight, hook, etc), and dissection cap on endoscope tip. The ESD steps are: saline lift, superficial marking of resection line, mucosal scoring, undermining of cut mucosal edge, insertion of scope tip/cap into the submucosal pocket, cutting of submucosal attachments, further mucosal scoring and polyp detachment until done. The excision time, margins, number of partial and full thickness injuries, and number of reinjections necessary to maintain lift were tracked.

**Results/Outcome(s):** A total of 30 ESD' have been performed by 2 surgeons. All have been successfully completed. The time required to complete the ESD ranged from 22 minutes to 111 minutes. The time variation is thought to be a function of tissue quality, ability to sustain mucosal lift and good conductivity as well as the skill of the endoscopist. A general downward trend in the number of partial and full thickness bowel wall injuries have been noted with time.

**Conclusions/Discussion:** This model has drawbacks but allows trainees to learn and carry out the basic ESD steps. It is best used with other models such as the bovine rectum/colon model which requires insufflation and a pattern-tracing scope tip control training model. It is believed that this type of training when coupled with periodic practice session will allow surgeons with a moderate volume of large sessile colonic neoplasms to perform ESD successfully in the clinical setting.

## Z-PLASTY PERINEAL HERNIA REPAIR USING BIOLOGIC MESH AFTER ABDOMINOPERINEAL RESECTION.

VR25

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**Purpose/Background:** Perineal hernia is an abdominal protrusion through the pelvic floor. Most occur as an incisional hernia following pelvic surgery. Prevalence of perineal hernias are low, ranging from 0.6 to 7%. The condition may be asymptomatic, but may cause pain or obstruction. Perineal hernia repair can be very challenging with limited literature describing successful techniques for

repair. We present a complex case of a perineal hernia with draining ascites after an abdominoperineal resection for rectal cancer that was treated successfully using a biologic interposition mesh with a Z-plasty closure.

**Methods/Interventions:** The patient was positioned in prone jackknife position. 30 degree Z-plasty incision lines were carefully marked on the patient. The excess skin of the hernia sac was excised and the small bowel contents were liberated from surrounding adhesions. The small bowel was then reduced back into the abdomen. Next, the Z-plasty flaps were created. Dissection carried out through the previously marked incisions through the subcutaneous tissue and gluteus fascia. The fascia was divided and the flaps were developed to the upper and lower extents of the hernia defect. Care was taken to include the fascia up with each flap. To begin the hernia closure, the hernia defect was measured and a biologic mesh was cut to the appropriate size. It was then sutured into place circumferentially in interrupted horizontal mattress fashion. Mesh was anchored at the level of the pelvic outlet to the surrounding bony and ligamentous structures. Once completed, the hernia sac was closed over the mesh, and a Jackson-Pratt drain was placed over the closure. Z-plasty was then completed by rotating flaps into position. Gluteus fascia of the outside edge of each flap was sutured to the adjacent native gluteus fascia in interrupted fashion. Next, the fascia of the inner edge of each flap were sutured to each other, completing the fascial closure. Skin was closed, and a negative wound vacuum dressing was applied.

**Results/Outcome(s):** We present a rare case of a complex perineal hernia with draining ascites after an abdominoperineal resection for rectal cancer that was treated successfully using a biologic interposition mesh with a Z-plasty closure. Patient recovered well with no recurrent perineal hernia at 6 weeks follow up. Flaps were almost entirely intact except for small amount of tissue breakdown at the tip of the upper Z-plasty flap.

**Conclusions/Discussion:** Perineal hernias are relatively rare, but can be technically challenging problems when they do occur. Evidence supporting an optimal approach is limited, but multiple techniques have been described. We present a step-by-step video of a successful repair of a complex perineal hernia through a perineal approach using an interposition biologic mesh and a Z-plasty fascial closure.

## PERINEAL PROCTECTOMY USING A CURVED CUTTER STAPLER, TO TREAT FULL-THICKNESS EXTERNAL RECTAL PROLAPSE.

VR26

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**Purpose/Background:** Perineal approach is a good choice in the external rectal prolapse treatment in frail patients. Modifying the transanal resection technique of internal rectal redundancy with curved stapler, allows perineal stapled external prolapse resection.

**Methods/Interventions:** An 89-year-old woman with pathological history of auricular fibrillation, chronic bronchitis, hemithyroidectomy and hysterectomy, presents with complete external rectal prolapse, pain, rectal bleeding, and associated incontinence. Perineal approach is decided. We present the video of the surgical technique done. Patient was placed in a slight Trendelenburg position to free the pouch of Douglas from any deep enterocele. Prolapse was initially divided using linear stapler, in two flaps. Subsequently, stapled transanal rectal resection with a curved stapler was performed.

**Results/Outcome(s):** Oral feeding was immediately started and inpatient hospital stay was 2 days. After 2 months follow-up, the patient doesn't have pain, fecal incontinence, soiling or rectal bleeding.

**Conclusions/Discussion:** This procedure allows a perineal resection of a full-thickness rectal prolapse. It is a safe, fast and easy technique to perform, avoiding more complex surgeries in frail patients.

## TAMIS REPAIR OF TRAUMATIC RECTOVAGINAL FISTULA.

VR27

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**Purpose/Background:** TAMIS was initially introduced as a technique to remove rectal lesions not ordinarily amendable to transanal excision using standard instrumentation. However, the TAMIS technique has not been previously described for treatment of a rectovaginal fistula.

**Methods/Interventions:** A young woman presented with a rectovaginal fistula as a result of a sexual assault. As the rectal side of the fistula was 7-8cm above the anal verge, standard anorectal retractors were unsuccessful in visualizing the opening. A TAMIS technique was then used to perform repair of the fistula.

**Results/Outcome(s):** Fistula repair was achieved utilizing the TAMIS technique. Fistula closure was noted both endoscopically and radiographically.

**Conclusions/Discussion:** TAMIS repair of a mid rectal to vaginal fistula may be considered if standard anorectal instruments do not allow access to the site of the fistula.

### RECONSTRUCTION WITH PERINEAL LIPOFILLING FOLLOWING EXTRALEVATOR ABDOMINOPERINEAL RESECTION FOR RECTAL CANCER.

VR28

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**Purpose/Background:** One of the major problems after extralevator abdominoperineal resection is perineal wound breakdown and infection, which can result in significant morbidity. The perineal defect often requires the use of a biological mesh, in order to prevent prolapsing of small bowel and development of a perineal hernia. We believe that the main cause for wound infection and perineal dehiscence is the deadspace between the mesh and the subcutaneous tissue. A myocutaneous flap would avoid the deadspace however it is time consuming and not without its own complications.

**Methods/Interventions:** Processed fat from a lumbar liposuction of the patient is injected into the perineal deadspace.

**Results/Outcome(s):** Since the induction of this procedure (10 patients), we managed to reduce the perineal wound infection from a rate of 47% to 0%.

**Conclusions/Discussion:** In this video we show how perineal lipofilling is an alternative solution in resolving the problem of the perineal wound infection after an extralevator abdominoperineal resection.

### STAPLED PERINEAL PROLAPSE RESECTION FOR FULL THICKNESS RECTAL PROLAPSE.

VR29

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**Purpose/Background:** Stapled perineal prolapse resection has been shown to have good short term outcomes in multiple small case series. The video demonstrates an example of stapled perineal prolapse resection.

**Methods/Interventions:** Stapled perineal prolapse resection is performed in the lithotomy position using several sequential firings of the GIA 75 mm green load stapler and the semi-circular Contour Transtar stapler. The patient is positioned in the lithotomy position following full bowel preparation and pre-operative antibiotics. This operation is an option for patients with full-thickness rectal prolapse in lieu of other perineal repair options.

**Results/Outcome(s):** Total operating time was approximately 30 minutes. The patient was discharged home

post-operative day 2 and had no post-operative complications. On three month follow-up the patient continues to do well with no element of rectal prolapse.

**Conclusions/Discussion:** Stapled perineal prolapse repair represents a fast and simple option for perineal repair of full thickness rectal prolapse.

### REDO PERINEAL PROCTECTOMY.

VR30

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**Purpose/Background:** To illustrate patient selection and surgical technique for redo perineal proctectomy procedure in case of recurrent rectal prolapse.

**Methods/Interventions:** With the patient in prone jackknife position, the rectal prolapse is fully exteriorized. The site of previous suture line is identified and the mucosa incised proximally to that location. After full thickness incision of the colorectal wall, the mesentery of the residual bowel is gradually divided close to the bowel wall up to the most proximal portion of the colon attainable without tension. A posterior levatorplasty is performed and the redundant colon and rectum is excised. A new coloanal anastomosis is created.

**Results/Outcome(s):** The procedure allowed for resection of the redundant colon without endangering the vascular supply of the remaining colon used for the coloanal anastomosis. The anastomosis was realized without tension with well vascularized tissues.

**Conclusions/Discussion:** Redo perineal proctectomy is a safe and feasible procedure in case of recurrent rectal prolapse.

### ROBOTIC- ASSISTED LAPAROSCOPIC PERINEAL HERNIA REPAIR FOR INCARCERATED HERNIA AND SMALL BOWEL OBSTRUCTION FOLLOWING TRANSABDOMINAL TRANSANAL PROCTECTOMY.

VR31

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**Purpose/Background:** Our patient is a 70 year old male with a history of rectal cancer who two years ago underwent a robotic assisted laparoscopic transabdominal transanal (TATA) proctectomy following neoadjuvant chemoradiation. After receiving adjuvant chemotherapy, his subsequent surveillance CT scans demonstrated a perineal hernia containing small bowel that was lateral to his coloanal anastomosis. He was asymptomatic during this two year period, however, he presented acutely with

a small bowel obstruction. A CT scan redemonstrated this perineal hernia within the levators with incarcerated small bowel. The patient had no signs of sepsis and the obstruction resolved with conservative management. A small bowel series reconfirmed the presence of small bowel within the hernia in the right ischioanal fossa. We decided to perform a robotic assisted laparoscopic perineal hernia repair.

**Methods/Interventions:** The Da Vinci Xi robotic platform was used for the surgery. Four robotic 8 mm trocars were placed in a straight line from the right anterior superior iliac spine to the left costal margin. The dissection started by identifying the perineal hernia within the levators. The small bowel had already been reduced from the defect. The prostate was retracted superiorly and adhesions were lysed sharply to clearly identify the borders of the hernia. The hernia measured 3 x 3 cm and two centimeters lateral to the coloanal anastomosis. The hernia sac was excised completely to avoid a post-operative seroma. The hernia defect was closed with continuous barbed #0 polydioxanone suture. A biologic mesh was placed in an underlay fashion with a 1 to 2 cm overlap and secured with a barbed continuous 2-0 poliglecaprone-25 suture and the case was completed.

**Results/Outcome(s):** The patient's post-operative course was uneventful.

**Conclusions/Discussion:** As with any incarcerated hernia, the treatment involves reducing the hernia, assessing for the viability of the hernia contents, repairing the defect, and reinforcing the repair with mesh if feasible. There is a known risk of perineal hernia after abdominal perineal resection. However, a perineal hernia infrequently occurs after a transabdominal transanal proctectomy since the colon occupies any defect created by the transanal intersphincteric dissection. We decided to perform this hernia repair through the abdomen to avoid a high infectious risk perineal wound and to place mesh in an underlay fashion, which leads to lower recurrence rates for incisional hernias. The robot allowed us to lyse adhesions in the narrow male pelvis, excise the hernia sac, and repair the hernia defect, which would be technically challenging using a straight laparoscopic or open approach. This robotic assisted laparoscopic perineal hernia repair has not been previously reported in the literature. Robotic management of this perineal hernia is a safe and feasible option.

#### REPAIR OF RECTOVAGINAL FISTULA BY MODIFIED MARTIUS FLAP.

VR32

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**Purpose/Background:** Rectovaginal fistulas can occur for a number of reasons, including obstetric trauma,

iatrogenic, radiation damage and Crohn's disease. Symptoms range from asymptomatic to uncontrollable passage of gas or feces from the vagina leading to poor quality of life for some patients. For those patients whom surgery is indicated, there are several different approaches depending on the fistula etiology and previous attempts at repair. These range from simple fistulectomy to transabdominal repair with tissue interposition to Martius flap interposition. Our patient in the video had previously undergone multiple various repairs which failed to provide adequate resolution of her fistula and therefore presented for a Modified Martius flap repair. The benefit of such a repair is to provide neovascularity at the site of repair with minimal cosmetic effect.

**Methods/Interventions:** Modified Martius flap repair.

**Results/Outcome(s):** Patient underwent the repair and reported resolution of her symptoms.

**Conclusions/Discussion:** Modified Martius flap repair is a viable and appropriate repair for patients who have undergone multiple other attempts at closure of their rectovaginal fistulas, possibly even as a first option depending on the nature of the fistula.

#### TECHNIQUES OF TENSION-FREE COLORECTAL/ANAL ANASTOMOSIS IN A REOPERATIVE ABDOMEN.

VR33

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**Purpose/Background:** After extended left colon resections for both benign or malignant diseases of the colon, achieving a tension-free colorectal anastomosis might be difficult due to reach issues. There are several maneuvers to overcome the reaching problems and to achieve a tension-free colorectal anastomosis. In this video, we will be demonstrating some operative tips to manage reach related issues preventing to perform a healthy colorectal anastomosis.

**Methods/Interventions:** We present a case of a 27 year-old male status post Hartmann's procedure due to sigmoid volvulus. While taking down the Hartmann's colostomy, we had the opportunity to demonstrate the techniques that may overcome the reach related issues. In order to overcome reach issues splenic flexure needs to be routinely mobilized. The inferior mesenteric artery and vein are ligated high. Retroileal anastomosis or Deloyers procedure might be useful to provide enough length for anastomosis in patients with short colon or history of prior colectomy. If the presence of middle colic artery is an issue it might be taken down prior to retroileal anastomosis.

**Results/Outcome(s):** .

**Conclusions/Discussion:** It is important to achieve a tension-free colorectal anastomosis in order to avoid morbidity related to complex colorectal surgery. We

believe the maneuvers shown in this educational video can be helpful to accomplish tension-free anastomosis.

### SAFETY ADJUNCTS IN A CHALLENGING LAPAROSCOPIC HARTMANN'S REVERSAL.

VR34

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**Purpose/Background:** Laparoscopic reversal of Hartmann's procedure (LRHP) in patients with a complex history of perforated diverticulitis is challenging due to extensive intra-abdominal adhesions, fistulas, and pelvic fibrosis. This video demonstrates the successful completion of a LRHP in a male patient with a BMI of 37kg/m<sup>2</sup> following an open Hartmann's procedure for perforated diverticulitis and concomitant ileocolic resection for terminal ileal involvement. The purpose of this video is to highlight the feasibility of a laparoscopic approach during a difficult LRHP as well as to demonstrate the utility of adjuncts, including lighted ureteral stents and immunofluorescence imaging, to help identify both ureters and colorectal vascular supply in a densely fibrotic pelvis.

**Methods/Interventions:** Video recording of a laparoscopic Hartmann's reversal was used to highlight the key steps and approach as well as the safety adjuncts used in this procedure.

**Results/Outcome(s):** Prior to surgery, bilateral ureteric stents are inserted by the urology team. The surgery begins with extensive adhesiolysis and mobilization of the left colon and splenic flexure. A fistula is noted adjacent to the prior ileocolic anastomosis, which has fistulized into the abscess cavity and the rectosigmoid stump. A 60 mm endoscopic linear cutting stapler is used to transect the fistula. Due to the patient's morbid obesity and very narrow, densely fibrotic pelvis, the identification of the ureters is not possible despite the placement of ureteric catheters requiring the exchange of the 5-French whistle-tip standard stents for lighted stents to visualize the ureters. The rectal stump is then safely mobilized and anastomosed to the descending colon using a circular stapler. Immunofluorescence imaging is used to assess and confirm adequate blood supply to the anastomosis.

**Conclusions/Discussion:** A LRHP is technically challenging and difficult however it is feasible. Using lighted stents as adjuncts during this operation may avoid conversion to an open procedure by facilitating ureter identification. In addition, immunofluorescence imaging allows for the assessment of anastomotic vascular supply in rare cases where extensive pelvic dissection of severely fibrotic tissue is undertaken.

### LOCAL EXCISION OF A VERRUCOUS CARCINOMA OF THE ANAL MARGIN AND RECONSTRUCTION BY BILATERAL GLUTEUS FASCIOCUTANEOUS FLAP.

VR35

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**Purpose/Background:** The incidence of anal margin carcinoma is rather low, lesions are typically well differentiated and slow growing, and the prognosis is more favorable than anal canal cancer. Verrucous carcinoma is a rare variant of squamous cell carcinoma and is also known as Buschke-Lowenstein tumor. Radical surgical resection is the standard treatment for locally confined disease

**Methods/Interventions:** A 69 y.o patient presented for a 4 months history of perianal pain and hitching. He had two operations for pilonidal sinus disease 30 years previously. His past medical history included diabetes, hypertension, and coronary artery disease. Physical examination showed a 5 cm lesion in the posterior perianal skin extending from the coccyges to the anal verge. Biopsy of the perianal mass demonstrated a well differentiated squamous cells carcinoma. A pelvis MRI showed that the lesion merely invaded the skin tissue without involvement of perirectal structures and anal sphincters. A wide local excision was planned with a flap to close the perianal defect. The patients underwent surgery under general anesthesia in prone position. The neoplasia is resected with 1 cm of free margin. The defect is then covered with the gluteal fasciocutaneous flaps in conjunction with a plastic surgeon.

**Results/Outcome(s):** The patient was discharged on postoperative day 12. He was followed up at 3 months intervals and he did not show any sign of recurrence after 9 months.

**Conclusions/Discussion:** In patients with verrucous carcinoma of the anal margin, wide surgical excision of all involved perianal skin and subcutaneous tissue is currently considered the standard surgical treatment in the absence of invasion. Large resection may require various flaps to close the surgical defect and may need the assistance of a plastic surgeon.

### ROBOTIC EXCISION OF RETRORECTAL MASS.

VR36

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**Purpose/Background:** The purpose of this video is to show feasibility of utilizing robotic technology in treatment of large retrorectal masses

**Methods/Interventions:** Video of robotic excision of retrorectal mass

**Results/Outcome(s):** 34 year old woman presented with large retrorectal mass not amenable to posterior approach. robotic approach was used to successfully remove the mass

**Conclusions/Discussion:** Robotic technology can simplify excision of large pelvic masses

#### LAPROSCOPIC EXTRAPERITONEAL COLOSTOMY.

VR37

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**Purpose/Background:** This video is intended to demonstrate how to create an extraperitoneal colostomy.

**Methods/Interventions:** Surgical case video of creation of an extraperitoneal colostomy.

**Results/Outcome(s):** Extraperitoneal colostomy is created.

**Conclusions/Discussion:** Extraperitoneal colostomy can be created using laparoscopic technique.

#### AUTONOMIC NERVE STRUCTURES DURING TATME IN OBESE.

VR38

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**Purpose/Background:** Understanding of nervous system anatomy in the pelvis is often inadequate. There seems to be some confusion on this topic during taTME procedures. This video gives a summary of the topic while presenting a taTME case performed on an obese male.

**Methods/Interventions:** A taTME case was performed on an obese and muscular male with a locally very advanced rectal cancer. Special emphasis was placed on identification of the autonomous nerve structures.

**Results/Outcome(s):** The procedure was successful. The diverting ostomy was reversed and the patient didn't experience any genito-urinary nor bowel dysfunction.

**Conclusions/Discussion:** Identification of all important autonomic nervous structures during taTME is possible. These structures should be preserved during dissection.

#### ROBOTIC- ASSISTED LOW ANTERIOR RESECTION WITH LOOP COLOSTOMY TAKEDOWN USING GELPORT PLATFORM.

VR39

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**Purpose/Background:** To demonstrate a novel technique for performing a robotic assisted low anterior resection.

**Methods/Interventions:** A gelport platform was used to minimize the size of the single surgical incision used for colostomy takedown, specimen extraction, and ileostomy creation.

**Results/Outcome(s):** Successful completion of robotic assisted low anterior resection without complication.

**Conclusions/Discussion:** The gelport platform is a beneficial tool when used in robotic assisted low anterior resection to accomplish colostomy takedown, specimen extraction, and ileostomy creation through a single surgical incision.

#### SEQUENTIAL LAPAROSCOPIC TATME.

VR40

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**Purpose/Background:** To discuss the procedure and anatomy of a transanal total mesorectal excision (TaTME) performed for a low rectal T3N0 tumor. This procedure can be performed via simultaneous laparoscopic and perineal dissection or, as in our case, sequential performance of these two dissections.

**Methods/Interventions:** A video was made showcasing a sequential TaTME with laparoscopic colon mobilization with coloanal anastomosis. The patient had a 3 cm low rectal tumor 2 cm from the dentate line for which he had previously received neoadjuvant chemoradiotherapy. The video focuses heavily on the perineal dissection, including key anatomical considerations which lend to a safe and efficacious TME using this innovative, minimally invasive technique.

**Results/Outcome(s):** A successful TaTME was performed with 0 of 11 lymph nodes positive, distal margin 1.1 cm, and circumferential margin 0.8 cm. The video elaborates on the anatomic considerations which prevent injury to adjacent structures during transanal dissection.

**Conclusions/Discussion:** TaTME presents a novel, minimally invasive means for the surgical management of rectal cancer which has been increasingly utilized as comfort with the procedure and instrumentation grows.

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